The Builder.

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The Conflict over the Employers' Liability Bill.

WE have of late had occasion to refer more than once to the Employers' Liability Bill, and we should not return to it were it not that the so-called contracting-out clause has occupied and appears likely for some time to engage so large a share of public attention. This position is, in some respects, to be regretted, because it was essentially desirable that the question of an alteration in the law in regard to the liability of employers for injuries to their workmen should not become a question of party politics. Unfortunately, we cannot disguise from ourselves not only that it has been made a party question, but also that Mr. Gladstone's Cabinet are seeking to make use of the present difference of opinion on the contracting-out clause for the purpose of getting up an agitation against the House of Lords. This journal has nothing whatever to do with party politics, but when we have to regard subjects which are of importance to our readers we must state our views upon them, whether or not they hurt the feelings of party men. At the present moment the fact that the Government have made this a party question, and are using it for their own purposes rather than looking to the good of the community, appears absolutely clear when the facts are impartially reviewed. The House of Commons refused to insert a clause to prevent members of certain existing mutual societies, the funds of which were contributed to by employers and employed, from contracting themselves out of the Act. The House of Lords passed a more extensive clause enabling employers and employed to exempt members of future as well as existing societies from the provisions of the Act under certain safeguards. In other words, a workman was to be enabled to make certain terms with his employer in place of going to law with the latter, if he received an injury not caused by his own neglect. The House of Commons has, at the bidding of the Government, disagreed with this clause, and the Government likewise declare that if the clause is retained they will drop their Bill. The Bill without the clause greatly improves the position of the workman; as, for example, by the abolition of the doctrine of common employment; and without the clause the Bill causes a distinct advance in the law in favour of the workman. It is obvious therefore that it would be to the advantage of the workman that the Bill, even without this much-discussed clause, should become law. But what advantage does the Government promise the workman by dropping the Bill if it cannot be passed in its modified form? None whatever; because if it is not passed this session it is highly improbable that it will be passed next session, and if a Conservative Government comes into power it will undoubtedly pass a Bill with a clause in it permitting contracting out. Again, it is obvious that if the Bill were passed in its present form as modified by the House of Lords it is open at any time, if the contracting-out clause proves to be unsatisfactory, to pass an amending Act replacing such clause and preventing contracting out. To the ordinary observer it is incomprehensible, then, why the Government prefer to drop the Bill. The answer is that it is done to create a prejudice against the House of Lords, and to get up an election cry. This is to make the public interest second to purely party advantage. Whether we like it or not, party Government is now a necessary element of our Constitution, but statesmen should endeavour not to allow it to work to the public hindrance. Burke is said to have given up to party what was meant for mankind; the present Prime Minister is making use of party machinery to injure the welfare of the community. For even if we assume that the majority of the workmen of the day are in favour of the Act being compulsory, a large and important minority are certainly in favour of a clause enabling workmen under proper safeguard to contract out of the Act; and the reasonable course under such circumstances would be, at any rate, to allow the present freedom to continue unless and until it is conclusively proved that it is not a real freedom but a spurious one, and that workmen are not strong enough to protect themselves. But if the workmen in the employment of Messrs. Armstrong are satisfied with a freedom to contract out, and can make an arrangement advantageous to the interests alike of employer and employed, surely it is idle to suppose that workmen in other cases are not also able to protect themselves. No doubt the Government prematurely committed themselves to the view of the trades' unionists when they should have taken up the subject in a judicial and impartial spirit, simply and solely with a view to the best interests of employed and employers. On the contrary, they have approached it from an electioneering point of view, and believing that the trades unionists are the strongest body prefer to stick to their guns, hoping that by so doing they will obtain more votes when a general election arrives than if they were frankly and fairly to admit that there exists a difference among workmen as to the right to contract out of the Act, and were to allow a clause to this effect to be inserted in the Bill.

As to the reasons for a clause allowing workmen to contract out of the Act, we have given them so often, and have so clearly declared our view, that we do not propose to refer to them again. Those who have perused this journal from week to week are in possession of them. What we desire now to do is to draw attention to the extraordinary and unfortunate position of the Bill at the present time—a position which, as we have shown, appears to be entirely the fault of the Government, who forget the old and true saying that half a loaf is better than no bread, and who intend to get an electioneering cry, and also, no doubt, because they do not wish to give in to the House of Lords, are prepared to throw away the measure in the form in which it might become law, rather than pass an Act which has been modified by the Peers at the desire of a great number—a minority, it may be, but still an important minority—of the workmen of the country. Again, too, there is this remark to be made: the Bill, if it becomes law without the contracting-out clause inserted in it, will put an end to the existing Societies. Once destroyed, it would not be easy, even if there came a legislative enactment in that direction, to renew them. The harm would have been done. But if the Bill were passed in its modified form, the opinion of the working classes on this point could be still further elicited, and an Act to prevent freedom of contracting out could be passed in the future. We doubt very much whether all the workmen who are

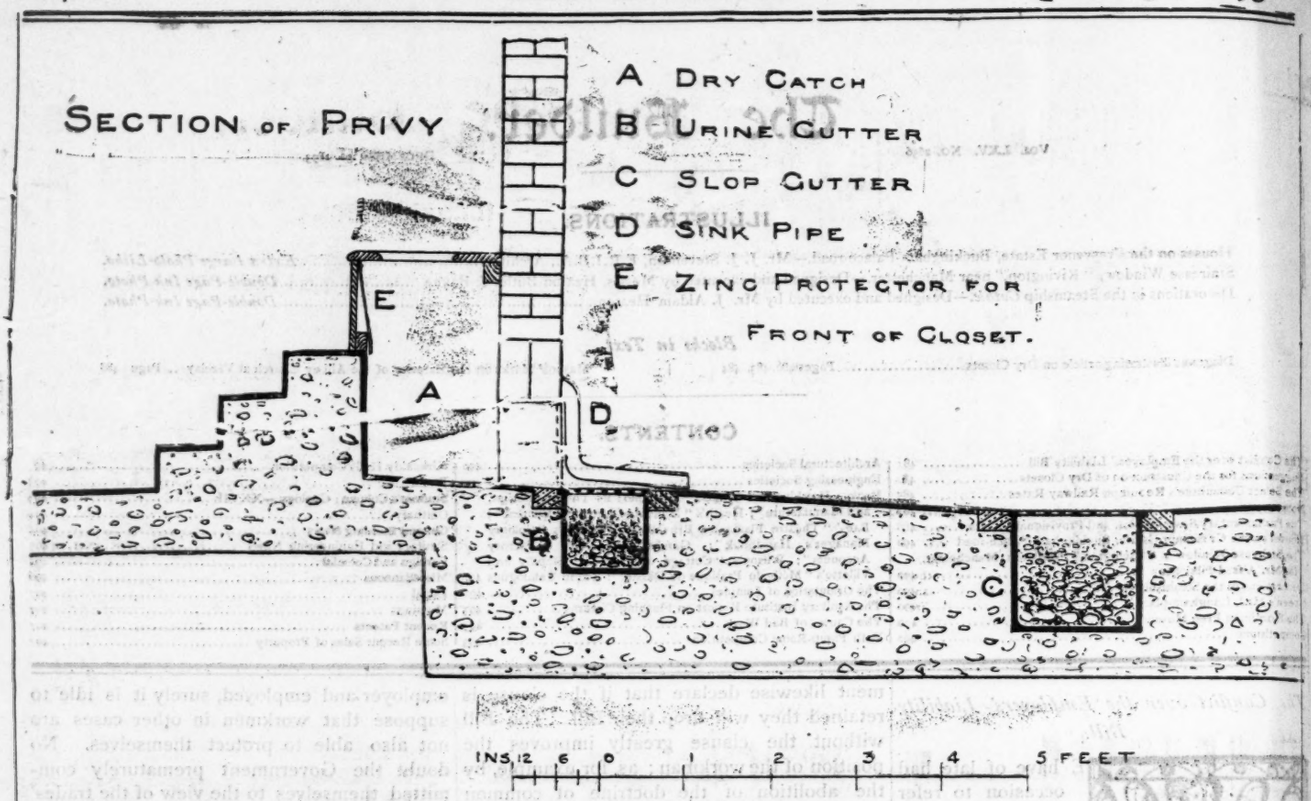

SECTION OF PRIVY
A DRY CATCH
B URINE GUTTER
C SLOP GUTTER
D SINK PIPE
E ZINC PROTECTOR FOR FRONT OF CLOSET.
INS. 12 6 0 1 2 3 4 5 FEET

Fig. 1.

said to be opposed to contracting out really understand the question at issue, nor do we believe that the public, as a whole, yet appreciate the vice of an Act of Parliament which would prevent a man from making a fair bargain with his employer, by which, in place of going to law when he has sustained an injury, and in place of obtaining no compensation whatever if there has been any negligence on his own part, he agrees to be paid a fixed sum in case of injury, whether caused by negligence on his own part or not.

There is also another curious feature about the present position of affairs. Not long ago the Government intervened in the coal strike, and brought employers and employed together. They sanctioned with their approval the establishing of a board of conciliation: in other words, they urged upon masters and men the desirability of entering into amicable relations and negotiations. But in regard to the Employers' Liability Bill they act on quite opposite principles—they prevent masters and men from making friendly arrangements, they endeavour to keep them at arm's length, and they bid the workman go to law in order to extract compensation. If their attitude in regard to the coal strike was right, they should have striven to place in the Employers' Liability Bill a clause which would help to bring together employers and employed, instead of opposing one which has that effect. The objects of party warfare are so great in the eyes of party politicians that the Government, if the House of Lords stand firm, may fulfil their threat and drop their Bill. It is most probable that the House of Lords will stick to their guns; they are fighting for additional freedom, and for the principle of friendly relations between employers and employed; they are supported by a considerable body of opinion among the working classes; and they have, as witness the testimony of Lord Fraser, a strong Radical, in his recent letter to the *Times*, the support of all thinking and reasonable men.

GLASGOW SCHOOL OF ART LECTURES.—The fourth public School of Art lecture was delivered on the 20th inst. in the West Room of the Glasgow Corporation Galleries by Mr. William J. Anderson, architect, his subject being "The Early Renaissance out of Florence."

SUGGESTIONS FOR THE CONSTRUCTION OF DRY CLOSETS.

BY G. V. POORE, M.D.

IN the *Builder* for September 16, 1893, there was inserted a criticism of my "Essays on Rural Hygiene," in which the reviewer, while speaking of the book in a manner that no author could be otherwise than satisfied with, seemed surprised that I should calmly contemplate the necessity of asking delicate persons to go out of doors for the purposes of natural relief.

Now, although I am most thoroughly convinced that the mixing of excrement with water is unscientific, and that it is only a question of time before we see this system absolutely abandoned in new houses, I do not believe that it is necessary to ask delicate persons to run the risk of exposure in houses where dry methods of excrement disposal are employed. If a very small amount of the ingenuity which has been lavished upon water carriage had been devoted to overcoming the difficulties which attend the safe and decent management of dry methods, these difficulties would, I believe, have long since disappeared. If architects and builders can be impressed with the *necessity*, on scientific, moral, sanitary, and economic grounds, of overcoming these difficulties the thing is done.

Personally, I am deeply impressed with this necessity, and I am glad to have an opportunity of bringing to the notice of the readers of the *Builder* some plans which I have devised for overcoming these difficulties, and which I believe to be satisfactory. The correct principle of dealing with excrement is that laid down by the well-known engineer, Mr. Richardson, of Clifton, and which is given in "Rural Hygiene." The principle is dryness and thorough exposure to the air; and if the sunlight have access also so much the better. I have lately remodelled an old privy on the plan advocated by Mr. Richardson, and have been astonished at the result. This old pit privy was emptied in June last. When it had been previously emptied I do not know. The contents were offensive, and were mixed with a hundred and one things—wire-netting, brickbats, canisters, broken crockery, &c.—which had been thrown down it "out of sight," and which, as they interfered with tillage, very greatly lessened the practical manurial value of the excrement. The contents were superficially buried, and in a very short time they were sufficiently sweet to allow of the undesirable ingredients being got out with a fork, and the ground being properly dug, tilled, and planted.

The pit was filled up level with the ground and the privy-seat was raised 18 in., and an approach to it made with three concrete steps. (See Fig. 1.) The catch below the seat was concreted and cemented, and the floor of it was made to slope towards an outlet 15 in. wide and 12 in. high on the ground level. This outlet was closed by a piece of wire-netting stretched on a frame which could be hung over the opening. The object of this was to prevent the access of animals which feed on garbage, without preventing the access of air. Before the privy was used a little straw was placed on the bottom of the catch and a barrow-load of dry earth was tipped opposite the outlet to absorb the urine, which would flow away down the sloping floor of the concreted catch. In the privy was placed a box of earth and a trowel, so that after the privy had been used a little earth might be thrown through the seat. The earth under such circumstances is really not necessary, and is added more for aesthetic reasons than from any sanitary necessity. This privy, which has been in constant use for the last six months, is always as sweet as possible. It can be emptied in two minutes with a garden hoe and shovel, and has, in fact, been emptied several times, for whenever the gardener wants a little manure for horticultural purposes, he knows where to go for that which is unsurpassed and which he can obtain and utilize without any offence whatever. The success of this privy has convinced me that the principle upon which it is constructed is sound, and in it, I believe, we have for cottages and small houses the solution of the sewage difficulty. It is a great gain that into such a privy rubbish which hinders tillage is not likely to be thrown, and certainly never should be thrown.

Now such a privy might very well be attached to a house by means of a lobby having cross ventilation, and seeing that a fall is necessary for such a privy, and that it is necessary

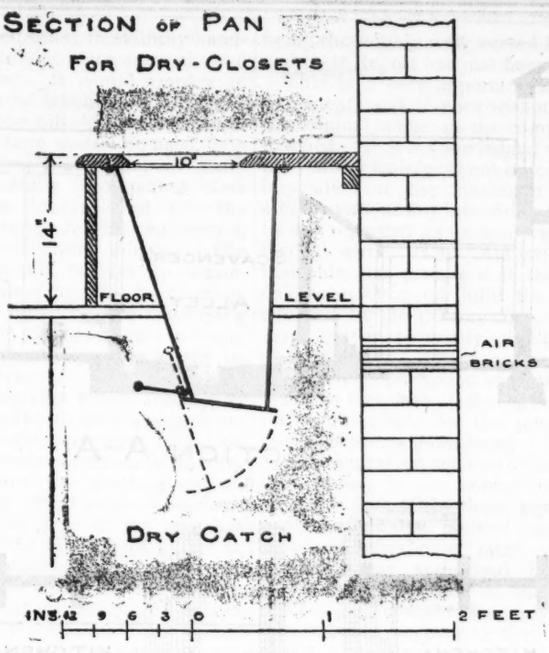


Fig. 2.

to raise the seat, it is obvious that there are advantages in approaching such a privy from the first or bedroom floor of a house.

I need not remind your readers that the angle turret which is so common in Scotch baronial castles is said to have been used for sanitary purposes, the excrement having been allowed to drop on to the ground beneath.

A house which I own at Andover became vacant in the summer, and I have been trying the experiment of giving it a dry privy, which should be of such a kind that no lady would object to use it.

Now I hold that every closet, whether a dry closet or a water closet, should be sequestered from the main structure of a house, and should be approached by a lobby having cross ventilation. Those who in the present day put closets and waste-pipes within the four walls which enclose the living rooms are not abreast of modern civilisation. The simplest plan for effecting my object in the present case seemed to be to throw an arch across the entrance to the stable yard, to place the ventilated passage on the top of the arch, and the closet on the far side of it on a level with the first floor, and with a capacious vault or "catch" beneath it. This has been ably carried out by the architect, Mr. Purkess, and Mr. Annett, the builder. The catch, though larger, is exactly on the same principle as that which has been described, and it has been provided with eight large air bricks, three of which are just below the level of the closet seat, three near the ground level and two intermediate in position. The bottom of the door is some 18 in. above the ground level, and in addition there is an opening for a dust-shoot, protected by a fine grating so as to insure that only dust and ashes and not cinders or clinkers are thrown into it. There can be no doubt that plenty of fresh air will get access to this receptacle. The arch is useful in another way, because the pipe which carries the bed-room slops is on a level with the top of it, and then dips down to deliver the slops in a gutter on the surface of the ground. Thus underground pipes and syphon-bends are rendered unnecessary, and, the fall being very great, no freezing can take place in the pipe.

Without special precautions such a closet would be cold and draughty, and I have endeavoured to overcome this difficulty by a specially constructed pan, closed at the bottom by a hinged flap, which opens and shuts automatically by means of a counterpoise. (See Fig. 2).

By means of this specially-devised pan all up-draught is prevented; the stuff drops out of sight, and the urine, owing to the obliquity of the bottom of the pan, runs away instantly. When the closet has been used, some earth is thrown in, and this has the effect of carrying away any paper which may lodge, and of deodorising any soiling of the pan which may have taken place. There are some points connected with this closet-pan and seat which require to be mentioned:—

1. The seat and accessories are made of the best polished mahogany, because I am very strongly of opinion that smartness leads to cleanliness.

2. The seat is only 14 in. above the ground, which is some 4 in. less than is customary. Closet seats are, as a rule, too high, and the low seat, with the position it necessitates, has certain physiological advantages which, however, can hardly be gone into in detail in your columns. It has one disadvantage, viz., that elderly people find a difficulty in rising, but this objection is easily overcome by fixing a handle in the wall, so that the arms may assist the feeble legs in the act of resuming the erect position.

It will be observed that the back part of the pan is set 3 in. beyond the rim of the seat and is nearly vertical, while the front part is set only 1 in. beyond the rim of the seat, and runs obliquely from above down and from before back. The object of this is to still further lessen the chance of the soiling of the back of the pan. The lower opening is slightly oblique, so that urine shall flow away instantly.

The supply of earth for this closet is kept in a box alongside the seat, and this box is filled from the outside by means of a hopper so arranged that the man who brings a fresh supply of earth cannot see or be seen by any chance occupant of the closet. This, again, is an important trifle.

The pans hitherto constructed on this pattern have been made of japanned iron. They have not to bear any weight or strain, and may be made very light. Enamelled iron or copper seem to me to be the best materials, but I have no doubt they could be effectually contrived in earthenware. The pans have been made for me by Messrs. Righton, 376, Euston-road. The pattern is registered.

To return from the detail of the pan and seat to the principle involved in this method of treating excremental matters. The dry catch as depicted has great advantage over any pail system, because with it one is less absolutely dependent on the scavenger. With the pail system, if the scavenger is unable from any cause, such as illness, to perform his daily duty, trouble begins to arise instantly, but with the far greater capacity of the dry catch, the accidental absence of the scavenger for a few days, or even a few weeks, is of very little practical importance, because the absence of urine prevents putrefaction and offence. My cottages, as described in "Rural Hygiene," are provided with pails, which are emptied every day. This has answered well, because the garden where the excrement is buried is only a few yards from the cottages; but were I to begin *de novo*, I should adopt the dry catch as the method which not only allows greater freedom to the owner but the one which is probably the most economical. The pail does not allow of that perfect aëration which is possible in the dry catch, and as it retains all the urine it is very liable to become offensive if there be any delay in removing its contents, and removal is difficult, because of the sloppiness of the contents. I believe that the dry catch, properly constructed, is admirably adapted for use in towns where dry methods of excrement disposal are in vogue. Where dry methods are in vogue it is essential that the excremental matters should be removed *every day*, and any sanitary authority which intends to adopt such methods must face this fact, and will certainly find that by doing so economy and efficiency are both enhanced.

If the catch be made of a proper curve and slope, and if the scavengers' shovels have a curve to correspond, it is certain that the daily removal of the three pounds weight of excrement, which is certainly the maximum amount of a household of five persons, and its transference to a suitable collecting cart, could be effected in a fractional part of a minute. If, *with daily removal* in view, the privies of city cottages were suitably planned, it is tolerably certain that a scavenger would clear sixty privies in an hour. It has always appeared to me that the pails which are used in big towns are the clumsiest and most unsatisfactory apparatus ever devised for excrement disposal, and that to allow such pails to collect fæces and urine for a whole week, until the contents are in a state of putrefaction calculated to poison the *two* unhappy men who are required to manipulate them, is wholly indefensible.

In towns the use of dry earth for absorbing the effluent urine, or for adding to the closets, is, or will be said to be, impracticable. I fancy the best plan would be to allow the floor of the catch to slope to a trough or deep gutter closed at both ends and sunk in the concrete, and filled with absorbent material of which any urban sanitary authority can generally command a supply, such as straw, paper, sawdust, woollen or cotton waste, &c. Such gutters should be provided with a protecting grating, and when the absorbent material will absorb no more, it will have become a most valuable manure and should be removed (see Fig. 1, B). This is a suggestion only, and is a plan which I have as yet had no opportunity of trying.

It goes without saying that the "catch" might be made to receive the dust and ashes of the house, but in such case a grating must be provided to the dust shoot so as to ensure that cinders and other coarse materials do not get mixed with the excremental matters and diminish their practical manurial value. To do this is to increase the difficulty of ultimate disposal. How often the urine gutter would need to be cleared is doubtful. A gutter a foot square in the cross section and 60 ft. long, such as might extend along the backs of half-a-dozen cottages having thirty inhabitants, would have a capacity of 60 cubic ft. or considerably more than 360 gals. The thirty inhabitants would certainly not contribute more than 60 pints (7½ gals.) of urine per diem, or rather more than 50 gals. per week, an amount which would be held in suspension by the absorbent material. It appears probable, therefore, that a weekly removal of the absorbent material in the gutter would be sufficient.

This gutter must be protected from rain. I think the difficulties of removing excremental matters from cities have been exaggerated, and it is certain that they have been intensified by faulty methods. If everything were done, as I have suggested, to facilitate daily removal, I think that one scavenger, with a donkey and small tank upon wheels, might collect from at least 300 cottages per diem, the excrement of 1,500 people weighing about 8 cwt. On this calculation, the daily excrement of 30,000 people would about fill an ordinary 10-ton railway-truck, and if a serious effort were made in such a town as Manchester or Birmingham to dispatch this material direct to the land it would merely mean that fewer railway-trucks would be "returned empty" than at present is the case. To believe that there would be any difficulty in transporting this stuff for any distance and without offence is to hold a very poor opinion of human ingenuity. To this end it must be fairly dry.

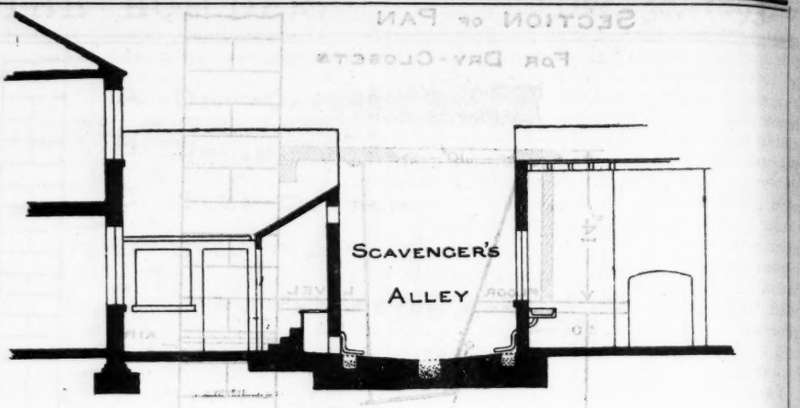
It has been said that classification is the basis of all science, and it most certainly is the basis of the scientific disposal of refuse. Refuse matter is most varied in its nature, and the items of which it is composed—excrement, rags, bones, paper, straw, sawdust, and other packing materials, cinders and ashes, old crockery, broken glass, old metal, &c.—all demand a different method of treatment.

When I see the grimy gentlemen in fantailed hats engaged in the marvellous operation of climbing over spiked railings with the object of filling a huge lumbering cart with a *mixture* of some or all of the things mentioned above, I feel that they are engaged in a bit of wilful mischief, and are merely increasing the dangers and difficulties of that sorting which is inevitable. In cities house-refuse should be collected every day, and the sorting should be done at once by the collector, with the intelligent co-operation of the householder. Things dissimiliar in nature should never be mixed. The first division is into putrescible and non-putrescible, and the former should be sent forthwith to the farmer to be dug into the ground. The non-putrescible refuse—glass, crockery, cinder, ash, metal—if sorted and temporarily stored in bins would probably pay the cost of its collection and removal and might probably yield a slight return. A great deal of the non-putrescible refuse might be of use to the Sanitary Authority on the spot for making foundations for paths and roads, or for scattering on the streets in slippery or frosty weather. Ash (not cinder) beneath the gravel on a garden path gives in time a firmness and stability which is remarkable. Whether it would work in with the macadam in road-making and cause a similar improvement in the road I do not know. It is difficult to understand why it should not do so. Non-putrescible refuse is not a danger to health, and it is certain that a great deal of it might be used for various purposes by the Sanitary Authority.

This immediate sorting is only possible when such materials are collected every day and the bulk is small.

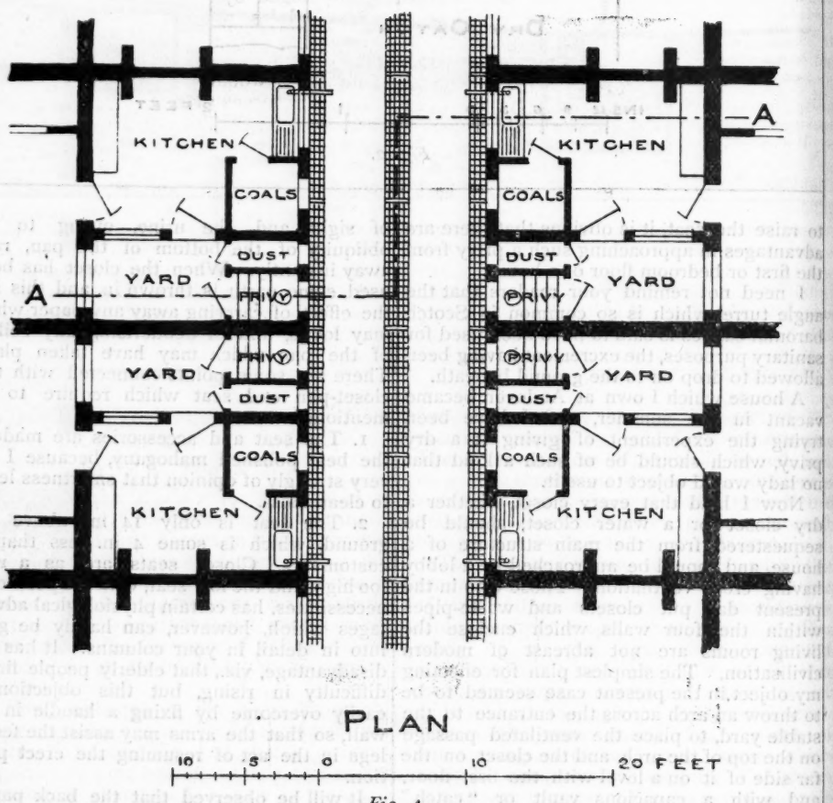
It seems to me that much of our municipal scavenging is too magnificent, and that it is often inefficient in proportion to its magnificence. The nimble boys who collect the street droppings and store them in bins which contain nothing but the valuable and marketable manure are the type of what is good. The clamping showy Clydesdale slowly dragging the most lumbering cart conceivable filled with an unmarketable mixture is the type of what is bad.

Farmers are shy of taking London sweepings because, as one told me, "they send such stuff." All organic refuse is good for the land, but the farmer wants it in a form which does not hinder tillage. Pieces of oil-cloth, hamper lids, dead dogs and cats are a nuisance to the farmer, and a very slight admixture of such things spoils the practical value (a different thing to theoretical value) of the manure which is mixed with them.



SECTION A-A.

Fig. 3.



PLAN

Fig. 4.

What is true of dry, or semi-dry, refuse is also true of liquid refuse. It is the admixture of totally dissimilar things which is, I believe, the main cause of our absolute failure to satisfactorily deal with sewage. In country places where excrement is collected dry it is a very simple matter to filter the house slops and purify them sufficiently to be returned to a stream. The difficulty and danger is enormously increased if the excrement be mixed with the slops. The cry at present is "Tout à l'egout," a cry which is bred of ignorance, moral cowardice, and despair.

In cities where dye-works, tanneries, slaughter-houses, chemical works, and factories of all kinds, are allowed to send their refuse into the rivers, it makes little difference whether the excrements of the inhabitants be added or not, and there are not wanting engineers who urge that in dealing with purely domestic sewage it makes little difference whether or no the excrement be mixed with the slops or otherwise. Engineers who urge this cannot have studied the question in its purely domestic aspects. From practical study of the question I am sure that it makes *all* the difference. If household slops be unmixed with excrement, then filtration can be commenced immediately they escape from the house, which is impossible if excrement be mixed with them. This is so easily effected that the householder in suburban country places ought to be compelled to return a clear effluent to the gutters. If manufacturing refuse (strong acids, strong alkalies, chemicals, antiseptics, &c.), be mixed with sewage it is clear that, as a manure, it becomes worse than valueless, and it is also clear that no one method of treatment can possibly purify a mixture which is not the same from day to day or from hour to hour, and the composition of which is scarcely to be guessed at.

The sanitarian who loses sight of classification, and who, in his eagerness for a big scheme, is neglectful of details, has not mastered the elements of his trade.

The only rational treatment for excremental matters is superficial burial, with a view to the production of crops, as detailed in "Rural Hygiene." It is to be hoped that, with this object in view, some Municipality will purchase a tract of land and endeavour to give the poor an object-lesson on the right use of refuse. If convenient access to such a farm by means ot canal, river, or railway siding could be obtained, it would make little difference whether it was two or twenty miles from the town. Such a farm

must be hand-tilled, and, if skilfully hand-tilled, would certainly produce as much food as a market-garden. It would employ an enormous amount of labour, and would at least pay its labour bill. I am not advocating that such a farm should be used as a playground for the semi-criminal, semi-imbecile, and generally incompetent class who go to form the "unemployed"; for the trade of agriculture, to be successful, demands both skill and energy. The "unemployed" should be set to stone-breaking, street-sweeping, dung-collecting, road picking and ramming, and scavenging generally, under the eye of foremen in town, and then, if found worthy, they might be exported to the farm.

Three of the diagrams which accompany this paper are intended to offer a suggestion of a plan to facilitate excrement collection in towns. Fig. 1 gives a section of the dry catch A, and shows the urine gutter B, which should be filled with absorbent material. The waste pipe of the sink has its termination on the far-side of gutter B, and is intended to discharge its contents on the concreted surface which slopes towards gutter C, and which is intended to carry both house-slops and rain-water. Gutter C would be filled with non-absorbent material, stones, broken crockery, broken glass, &c., and would cleanse and purify the slops sufficiently to allow of their being discharged into a stream. It seems far more rational to commence the filtration of slop-water *at once*, by a process which aërates and cleanses it than to take it for miles in dark, airless, underground pipes, and allow it to reach its destination in no better condition than when it started. *Such a process is only possible if the excrement be treated and collected separately.*

Figs. 3 and 4 are intended to show the section and plan of a group of the smallest town tenements, with a scavenger's alley between them and the three gutters, two (B B) to be filled with absorbent material to collect the urine, and one to be filled with non-absorbent material to filter and aërate the slop-water which should always flow in open channels when practicable. The "scavenger's alley" should be protected by gates. It is thought that the excrement would be primarily collected in comparatively small vessels, like garden water-tanks upon wheels. The excrement having been allowed to drain before collection, and being in a semi-dry sticky condition, would have no tendency to slop about during a journey, and in a covered vessel such as I have described, might be sent any distance without danger or offence. Arrived at the farm, the tank would be transferred to a second pair of wheels, and by being tilted would easily deposit its contents in a furrow previously made in the ground with a spade. The tank should be dried and lime-whitened and returned to the town, and three days after the deposit of the excrement in the ground, plants of the cabbage order should be dibbled in.

My thanks are due to Mr. Thomas W. Cutler, F.R.I.B.A., who has kindly made the drawings of Figs. 1 and 2 for this paper from sketches furnished by myself. G. V. P.

THE SELECT COMMITTEE'S REPORT ON RAILWAY RATES.

TWELVE months ago the trading public were just beginning to feel the effects of the new railway rates, the indignation and alarm caused by the prohibitive nature of the advances then made culminating in an appeal to Parliament for the appointment of a Select Committee, "to inquire into the manner in which the railway companies had exercised the powers conferred upon them, and to consider the desirability of adopting any other than the existing means for settling differences between the companies and the public." A very strong Committee was appointed, the majority of the members being thoroughly well versed in the subject, and their Report has just been issued.

This is a very important and instructive document, and it goes without saying that the original action of the companies is condemned. It is acknowledged on all hands—the railway managers not excepted—that the imposition of the maximum rates at the outset, without any intimation that they were to be regarded as temporary, was a great tactical error. The Committee go further than this, and remark that they feel it difficult to understand fully the explanations afforded by the railway companies, and still more difficult to justify what they do understand of them. These explanations do not, it is shown, correspond with the statements made on their behalf during the progress of the inquiries held for the purpose of determining the maximum rates.

The Central Association of Master Builders of London, in the course of the formal objection lodged by them against the companies' schedules, pointed out that if the proposed maximum rates and terminal charges were authorised by Parliament, the companies would be enabled to make much higher charges than they had for years been making, supporting their objections by tables, comparing the old and the proposed charges on various classes of building materials between representative stations. This, and similar action by other trade associations, resulted in the original proposals of the companies being considerably modified by the Board of Trade, although a margin for contingencies was still left between the old actual rates and the new Parliamentary maxima. The Committee express their opinion that this margin was not given in order that immediate advantage should be taken of it, and that the contingencies which it was intended to meet had not occurred when the companies put the new maxima into operation. The managers doubtless considered that they had discovered a satisfactory solution of the difficulty when they decided to limit all advances to 5 per cent., and it appears highly probable that had they adopted this course at the outset, the Select Committee would never have been called for. There would, of course, have been plenty of opposition, but it would not have been so wide-spread, and would, therefore, have been more easily overcome. The Committee, however, think that it was not the intention of Parliament that the companies should raise their non-competitive rates all round, even by 5 per cent., for the purpose of recouping themselves for reductions of other rates which had been pronounced unreasonable. They give the following highly instructive illustration of the effect of this operation upon the returns of the Great Western Company, who had originally estimated the reduction of revenue caused by the lowering of maximum rates below the old actual rates at 93,000*l.* a year. The effect of the January rates would have been to recoup them by an amount far exceeding the 93,000*l.* a year, but towards the end of March the principle of confining such increases to no more than 5 per cent. of the previous rates was adopted. The traffic of a single day (May 4) was then taken, and from this it appeared that the losses only amounted to 80,000*l.* a year, while the increases of rates on that day were in the proportion of about 50,000*l.* over and above the 80,000*l.* of loss. Further reductions were subsequently made, and from a table of traffic on August 4 it appeared that the increased proceeds of rates were in the proportion of about 14,000*l.* over and above the 80,000*l.* of loss. In other words, the company had raised the rates of one class of traders by 94,000*l.* a year in order to recoup itself for reductions to other traders amounting to 80,000*l.*

This question of recoupment for losses is a most complicated and difficult one, the railway managers having to contemplate it from other points of view than that dealt with by the Committee. For example, the revision has not simply resulted in increasing the carriage account of one trader and reducing that of another, but in numberless instances the rates charged to one person are variously affected—some charges being raised, others lowered. The reductions are compulsory, *i.e.*, the rates previously charged, being above the new statutory maxima, cannot be maintained; and a trader may quite possibly be a gainer by the revision, even though some of the rates charged to him have been advanced. There would doubtless have been very few indeed whose accounts would show a net gain in this way had the rates of January last been maintained; but with the advances limited to 5 per cent., it would not be surprising if some were now gainers rather than losers, while it is clear that in many accounts showing a net increase the percentage cannot now be so very excessive.

This is fairly open to the objection that the companies should have no right to nullify in any degree the advantage derived through reductions in rates, as the fact that a rate has been compulsorily reduced implies that the original charge was unreasonably high. It would be very irritating, for instance, for a builder who has been paying a very heavy freight on Welsh slates, to find the rates for this traffic at last reduced, and the carriage on deals and ironwork correspondingly advanced. It will be noticed that the Committee speak of the 5 per cent. compromise in a guarded manner, and while not absolutely condemning it, they clearly disapprove of it as a principle or basis of settlement.

As to the desirability of adopting other than the existing means of settling differences, the Committee report favourably of the working of the Conciliation Clauses of the Act of 1888, but recommend some alteration with regard to the Railway Commission. They consider that it will be difficult to justify the continuance of the Commission as at present constituted, that one of the members should be experienced in trade, and that the appointment of the Commissioners should be open to revision from time to time, and should not necessarily carry a pension. This was originally prefaced by the words, "While not prepared to recommend the abolition or reconstitution of the Commission, until some further experience has been had of it, under a more normal condition of things," while more detailed recommendations were also made as to the qualifications desirable in the case of lay members of the Commission. The paragraph was, however, considerably cut down at the instance of Sir Julian Goldsmid.

A close division took place respecting the insertion of a paragraph expressing the opinion of the Committee that traders should be protected against the imposition of unreasonable conditions of transport in risk notes and otherwise. This was suggested by Sir A. Rollitt, and was only carried by a majority of one vote. Some of the new conditions imposed at the commencement of 1893 were decidedly unreasonable, and the mere fact of their withdrawal under the pressure of combined public protest affords no protection for the future, and traders are still naturally apprehensive.

The Committee have referred specially to the terminals question as it affects the owners of private sidings, in which many of our readers will have a practical interest, although they confine themselves to the statement that the companies are not dealing with it in a satisfactory manner. It is noticeable that the paragraph, which reads as follows, was not in the original draft of the Report. "In the course of the inquiry it has been elicited that under the Act of 1888, it is sometimes difficult for traders to obtain from the railway companies proper details of charges for terminals, and that the question of charges for services at private sidings is somewhat obscure." This subject has been before the Board of Trade, in their capacity as mediators between the public and the companies, but without any decision having been arrived at, owing to the legal

issues involved. The Board, have, however, placed on record their opinion that the total charge for siding traffic should not be the same as for traffic on which a station terminal is properly chargeable; but notwithstanding this, the owners of private sidings are experiencing great difficulty in obtaining rebates. It will be remembered that the representatives of the building trades always strenuously opposed the granting of power to charge terminals at all.

The Committee confirm the impression which has been gaining ground as to the Act of 1888 being prejudicial to traders in one important respect. It was, previously, never quite clear whether an appeal would lie against a rate simply because it was unreasonable; but the Report clearly shows that the effect of this Act, whether it was fully contemplated by the Board of Trade and Parliament or not, is to clear up any doubts as to the scope of previous Acts, and to make it certain that no rate can now be questioned at law if within the maximum—except those which are open to objection on the ground of undue preference. It is extremely improbable that Parliament did contemplate such a result, and we gather from the observations made by the Committee that they take the same view. They think that some further step must be taken to protect traders from unreasonable raisings of rates, even within the maximum charges defined by Parliament. They consider that when the Conciliation Clause fails to result in an amicable settlement, the Railway Commission should be empowered to decide whether the increase is reasonable or not.

It seems inevitable that further legislation will have to be undertaken before this troublesome subject can be considered as satisfactorily disposed of, and that some provision must be made to prevent the recurrence of a disturbance such as the trade of the country has been subjected to during the past year.

NOTES.

ONE of the competitors in the Bath Pump-room competition, a well-known architect, sends us the Instructions issued to competitors, drawing our attention to some further points in connexion with this ill-managed business. It appears that a great show was made of affording full information to competitors, by supplying them with lithographed plans, sections, and elevations of the ground and existing buildings, and a couple of photographs; and a paragraph occurs near the conclusion of the instructions to the effect that "the above particulars are considered to be all that is requisite for competitors to be supplied with in order that they may compete, and no other information will be afforded under any pretext whatever." Now our correspondent states that the plans do not fit over one another, the datum line is wrong on one of the sections, and the whole are very badly drawn. But there are directions in the instructions which required further interpretation as to how they were to be construed. "Light must not be interfered with to the excavations beneath the street" was a requirement impossible to comply with literally; possibly that is only a defect of wording. "The position of the ancient walls lately discovered must be in no way interfered with by the new buildings"; what does "interfered with" precisely mean? May they be built on or not? There is nothing to show in the instructions, which are equally vague on one two other points. Meanwhile the Surveyor to the Corporation, who has all this information at his door, draws up the instructions, and then goes in as a competitor himself. It may be some poor satisfaction to the competitors to reflect that the Surveyor has been thoroughly discredited in public opinion by his action; but as matters have been treated, the discredit is reflected on a large proportion of the Town Council also; and this after a quite unusual blowing of trumpets over the peculiar and unprecedented fairness with which this competition was to be conducted. On other grounds it may be questioned whether the scheme is one which ought ever to have been propounded at all. It is only within the last few days that many people at a distance have realised the fact that these proposed buildings were to be erected over the exceptionally valuable and interesting Roman bath, one of the most notable Roman remains in England, and that all the designs at first selected for premiums make use of the Roman piers to support their substructure. The covering-in of the Roman bath would in itself be a deplorable step, and it appears very doubtful how far the ancient piers would be adequate for this use without treatment which would destroy most of their archæological value. The best advice we can give to the Bath Town Council is to pay the first premium to the design placed first, to give the second premium to the design placed third (omitting "design O" altogether); to ask Mr. Waterhouse to select the best of the remaining designs for the third premium; and then to defer the whole business till they have time to reconsider whether they were not doing a most foolish thing in covering up the Roman bath, and whether they ought not to carry out their "improvements" on some entirely different lines.

RECURRING to the subject of our article of last week on the "Fall of a Factory Chimney," it may be useful to consider what would have been the result if the chimney had been built either octagonal or circular on plan instead of square. The pressure of the wind on an octagonal chimney is less than on a square one of the same diameter or width, and upon a circular one it is less than on an octagonal, the proportions being 15 : 12 : 10. It must not, however, be forgotten that the weight of the chimney is less in the octagon than in the square, and less in the round than in the octagon, the walls having the same thickness in all cases. Consequently, the moment of resistance offered by the weight will be reduced in like manner. The proportions of the weights are those of the areas of the several bases, and are very nearly as $4 : 3\frac{1}{3} : 3\frac{1}{7}$. Therefore, in order to compare the effect of the wind on chimneys built with square, octagon, and round plans, we must have the moments of resistance in the above proportion. We found before that the moment of resistance of the square chimney was 350,658, consequently that of the octagon will be 292,216, and of the round it will be 275,517. We must also at the same time take the moments of pressure in the proportions of 15 : 12 : 10; the octagon being four-fifths of the square, and the round two-thirds of the square. If we put p_1 for the pressure per square foot on the square chimney, p_2 for that on the octagonal chimney, and p_3 for that on the round one, we have for the moments of pressure $p_1 \times 12{,}144$, $p_2 \times 9{,}716$, $p_3 \times 8{,}096$. Therefore—

$$p_1 = \frac{350{,}658}{12{,}144} = 28{\cdot}87 \text{ lbs.}$$

$$p_2 = \frac{292{,}216}{9{,}716} = 30{\cdot}07 \text{ lbs.}$$

$$p_3 = \frac{275{,}517}{8{,}096} = 34{\cdot}03 \text{ lbs.}$$

We see, therefore, that the advantage gained by using either an octagonal or a round plan for a chimney is not so great as would at first sight appear, but in the present case it would most probably have saved the chimney from falling. The chief objection to using any plan but the square is on the score of expense, as there is much more cutting required in building an octagon or round than with the square; and it would be cheaper to give a wider base and a little more thickness to the walls of a square chimney than to use either of the other forms. It was mentioned in the evidence that the chimney which fell had a slight cant in the direction in which it fell, or that it was somewhat out of the perpendicular. This would reduce the value of the moment of resistance very considerably, as in consequence of its being out of perpendicular a plumb-line dropped from the centre of gravity would fall nearer the outer edge than it would do if it was perfectly upright, and this would reduce the length of the lever arm. Suppose, then, that instead of this arm being 2 ft. $10\frac{1}{2}$ in., as we have previously taken it, it is reduced to 2 ft. 6 in.; then the moment of resistance is 304,920 instead of 350,638, and the value of p is $\frac{304{,}920}{12{,}144} = 25{\cdot}11$ lbs., so that the chimney would be overturned with much less wind-pressure than if it had been perfectly erect. And as it is a very common thing to see tall chimneys more or less out of perpendicular, it becomes an important item in the calculation to take into consideration the amount of this deviation from the vertical line.

THOUGH the German Architectural Competitions are generally well managed, there is still a tendency to give the premiums to the authors of the most showy façades, instead of to the authors of the most practical all-round design. For some time there has been a strong feeling among the leading architects that the present competition arrangements might be modified, so as to prevent this anomaly, and, at the same time, to lessen the expenses constantly incurred by competing architects in the preparation of their drawings. To this end the *Deutsche Bauzeitung* proposes the system of preliminary competitions, open to all, for plans to a small scale, with the main outlines of the sections and elevations only. These preliminary competitions are to be followed by a limited competition between the authors of the best plans, who should receive a reasonable remuneration for the preparation of the more complete designs necessary for the final selection. No premiums are to be given except this remuneration, the successful architect, however, receiving the assurance of having the erection of the building if carried out, or a compensation in case the works, for which he has prepared the drawings, are not taken in hand within a reasonable period. We understand that the Vereinigung-Berliner-Architekten is giving the proposed reform serious attention.

FROM the annual report of Mr. E. Robson, Surveyor to the Willesden Local Board, we learn that a considerable extension of wood paving for roads is being made in that district, though apparently in a rather experimental spirit, and with some doubt, on the Surveyor's part at least, as to the result. He refers to the undoubted drawback to this method of paving in cities caused by "the sickly and unwholesome odours" arising from it in wet weather, though thinking that with the lesser traffic of suburban roads the nuisance is not so pronounced. However, for the present the experiment is being made with several roads in the district. The question of the disposal of road refuse is also touched upon, and the Surveyor suggests that this should be used on land purchased for the purpose, the clay comprising the site being excavated, burnt, and utilised on the roads, and the road grit disposed of in the excavations thus made, burning all the larger particles of vegetable matter and whatever else might tend to create a nuisance or to be insanitary. It is suggested, however, that the opinion of the medical officer should be taken on the point before trying the experiment. The question of drain ventilation comes up in this report, and it is stated that the fixture of vertical pipes and iron columns, from 14 ft. to 16 ft. in height, has greatly tended to lessen the evil of smells from the drains, which are attributed to some extent to the inadequate flush of the two-gallon cisterns. We presume that these vertical pipes "16 ft. high" are in quarters apart

from houses, otherwise this is not nearly high enough. It is complained that great difficulty is found in obtaining the permission of owners to fix these shafts on premises in which they are interested, and that "if only co-operation with the Board were universal on the part of the public, the whole of the sewers in the district could thus be ventilated and the undoubtedly objectionable surface grating entirely abolished." Still we suggest that the height of the pipes is an important consideration, and that whenever they are near to or against houses they must be taken up higher than the highest window, or the last state will be worse than the first.

THE thirty-seventh annual report to the Board of Works for the Hackney District, by their Surveyor, Mr. Lovegrove, is partly of interest in regard to information it gives as to the state of labour in the district. It appears that the expenditure for labour is still increasing, and appears likely to increase, and that in greater proportion than the added lengths of new roads would suggest :—

"Labour Unions also seriously affect expenditure for labour. Workmen are urged to discontent, and naturally unite in the endeavour to obtain more wages, and to work less hours for the higher pay. It is suggested, however, that the greatest benefit which may result from such endeavour is, by reducing the hours of work, to increase the number of workmen. The hundreds of able and honest workmen applying for work during the year, especially from September to March, is painful to note. . . . The roads in years past have been the refuge of needy, worn out, and unfortunate men. In the earlier years of your Surveyor's office, workmen were paid 2s. per day. Gradually, on your Surveyor's recommendation, this was increased to 2s. 6d., 3s., and so on, until the present rate of pay, 4s., has been reached; but in those earlier years gangs of outdoor paupers were sent from the Union during the winter season, and formed the necessary addition to the working staff. The proximity of shoots all over the district at that time admitted of truck work partly in lieu of cartage, the trucks being loaded with road sweepings and taken to the shoots, of which there were many. It has been the practice through all the years to add to the staff for winter work, and not infrequently this increased staff has been continued partly through the summer on requirements incidental to special work. However, it appears that many of the surplus labouring men of the district—some of them different from the class of men referred to, and much more able—regard the Board as bound to provide work, and that for all. Of course this cannot be. The problem is a difficult one. The men are too many for the district, and not for this district only, but for many others also, and the matter would appear to demand that some Imperial provision should be made, and that soon, for so serious a necessity. Much good was done by your Board for the Unemployed last winter, in response to the urgent representations by deputations from the Unemployed, but it is a question as to how far this can be repeated."

It is noted that the continuity of the wet season had a most disastrous effect upon the roads, which however gave occasion for the useful employment of a good many men who would otherwise have been without work. This does not appear to have been economical work for the district, however, as the Surveyor calculates that the cost of the same work by contract would probably have been 10 to 15 per cent. less. In regard to underground conveniences the Surveyor suggests very rightly that the Board have made a serious mistake in not providing such accommodation for women as well as men. It is really time that there should be an end of this antiquated prudishness on such a serious matter, and the Hackney Board of Works must be rather behind the age if it cannot recognise this.

THE Budget of the Berlin Municipality for 1894 for the first time includes the long-promised item of 5,000*l.* for works of art to be used in the decoration of the city and its civic buildings. The sum will henceforward be voted annually, and is to be gradually increased in accordance with the development and the financial state of the city. The money is to be specially devoted to the encouragement of the younger artists, the council of whose representative society made the suggestion for the proposed expenditure. The management of the fund will be in the hands of a special Art Committee, whose members are to be elected from the body of the councillors, and it has been decided that the first work to be purchased will be a gigantic bronze statue of "Berolina," a model for which was prepared by Herr Halmhuder for some provisional decorations on the Potsdam Place when the King of Italy visited Berlin. The statue is to be placed on the Alexander Place, close to the Berlin "Scotland Yard."

IN reference to the subject of window-cleaning accidents, a correspondent draws our attention to the fact that the Glasgow Building Act includes a By-Law providing that "in dwelling-houses, all window-sashes above the ground-floor shall be hinged or constructed so as to admit of the outside of the windows being cleaned from the inside of the apartments." Possibly such a regulation as this will before long be generally adopted in building By-laws. It hardly seems probable that we shall get rid of this class of accidents until some such regulation is enforced; a consideration which will be encouraging to the numerous patentees of hinged and reversible sashes.

IN Dr. Airy's report to the Local Government Board on the sanitary condition of Tenbury, in Worcestershire, we find the combined evils of well water supply and ill-constructed cesspools united, as they so frequently are. We learn that the water supply is drawn exclusively from wells sunk in the immediate vicinity of the dwellings which they supply. On the point of low ground on which Tenbury stands, the subsoil consists of a bed of clay, four or five feet thick, resting on a bed of river gravel, below which, at a depth of 20 ft. or more from the surface, the well-sinkers reach the sandstone rock. The gravel is full of water, the level of which is found to vary somewhat with the varying height of the water in the river, but is generally found about ten or twelve feet from the surface. From an experienced well-sinker in Tenbury Dr. Airy learned that, in sinking a well, he almost always found the water in the gravel coming in strongly from the west or south-west side, and rapidly rising to a fixed height and no higher, while, by the visible movement of the clear water across the turbid, he could see that the water was passing out as fast as it came in. From this evidence it would appear that the whole body of water in the gravel has a common movement under the superincumbent clay, in a general direction from south-west to north-east. This fact is important, as bearing upon the question of the possible diffusion of dangerous impurity throughout this water-bearing stratum. Along with this, in order to form a true idea of the sanitary condition of the district, we must take the information as to the manner in which the soil through which these wells are sunk is liable to pollution from cesspools. Dr. Airy says :—

"With the exception of a few earth-closets and about twenty-five water-closets in Teme-street, the prevailing form of excrement receptacle is the pit-privy. Some of these bear evidence of having been improved or remodelled within the last few years, but not a few remain unreformed, with large pits extending forward under the floor, difficult to get at, and therefore rarely emptied; or with larger middens at the back—one measuring 7 ft. by 6 ft. by 3 ft., another, 5 ft. by 8 ft. by 3 ft.—and so on. Some are covered, others are uncovered, and in some instances receive roof-drainage as well as direct rain. There seems to have been no uniform rule or system in dealing with these nuisances. With regard to the most flagrant examples, the Inspector of Nuisances assured me that they were then under notice for alteration or reconstruction. This ought to have been done long ago. The emptying of the privy-pits and middens is very irregular, according to the size of the receptacle and the opportunity of arrangement with the farmer who takes the manure. Some are emptied only once or twice in a year. The old brick, uncemented midden pits, allow a leakage of their fluid contents into the soil beneath. In some cases, probably, this is arrested by the bed of clay in which the pit is sunk, but there must be many cases where soakage takes place into the gravel, and, therefore, as above described, into the general body of sub-soil water which fills the shallow wells."

It is astonishing how constantly we meet with this condition of things in rural districts; water derived from wells sunk into ground abounding in percolating cesspools. It seems to us that some general and energetic action should be taken by Government to put a summary end to this state of things. The report concludes with the recommendation "that the Sanitary Authority should, without delay, take action with respect to the water supply, the unwholesomeness of which as now existing is sufficiently established; whilst the general inaction of the Authority in regard to scavenging, river purification, and regulation of slaughter-houses and dairies is deserving of grave censure."

THE report made to the Local Government Board by Dr. Bulstrode, upon the general sanitary condition of the Borough of Poole, is less unsatisfactory than some reports of the kind, except in regard to one difficulty, which seems to be a constantly recurring one in rural districts, viz., the disposal of excrement. The water supply is reported as good, but in regard to the other question we find that matters are in a very unsatisfactory state :—

"There being no sewers in the borough, the system of storing up excrement on the premises is the one generally adopted. Of this system there are several varieties; in the better class houses cesspools are used; but these are not often, except in new houses, properly constructed, ventilated, or disconnected. In the poorer dwellings the most prevalent method of disposal is by means of a huge privy vault, constructed below the level of the ground. These vaults are lined for the most part with brick, and with the exception of some of those more recently constructed, are not watertight. In the parish of St. James's a very large number of these privy vaults are situated in such close relation to the houses in the courts and alleys that they cannot fail to be both a nuisance and dangerous to health. In some cases the privies located over these vaults are situated immediately beneath windows, and the privy doors open directly alongside the doors of the neighbouring dwellings.

Not only in some cases are these privy vaults of enormous dimensions, but in numbers of them the contents leak out into the surrounding soil. The vaults are emptied when full; and some about which I made inquiries had not been emptied within the memory of the inhabitants of adjoining houses.

In one instance in a house in Strand-street, I was informed by one of the oldest inhabitants that the privy vault, which was situated within 5 ft. of her windows, had been emptied once within the last twenty-three years, but she was unable to remember the exact date. The vault, she also said, was a *very* large one.

In some cases I was told that at very high tides the privy contents overflowed the vaults, causing, as may be imagined, a great nuisance. Instances of this sort of thing are, it appears, by no means rare in Poole."

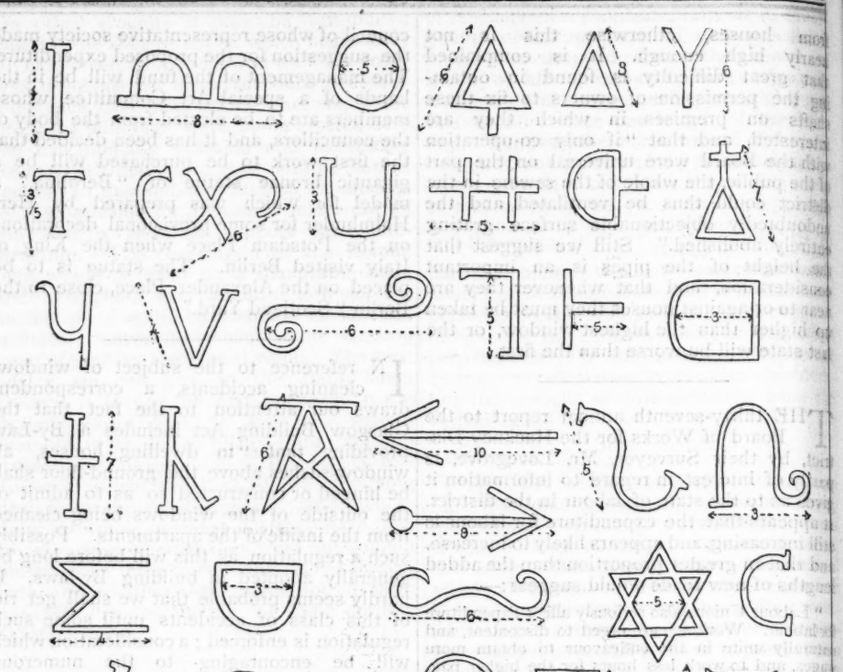
THE collection of Hunterian relics at the Royal College of Surgeons in Lincoln's Inn Fields has recently been enriched with an interesting set of drawings illustrating the College and Museum's earlier history, and John Hunter's domestic life. Mr. George Scharf's view of the new buildings for the former shows the Duke of York's Theatre (seen from the north) as it appeared in 1837, being at that day Spode & Copeland's china warehouse, and whose site, to the spectator's left, is now covered by the Museum south-east room. Another drawing, by William Clift—who was Hunter's assistant and first curator, and was instrumental in preserving many memorials of his master—represents the interior, having bays lighted by cupolas, of the original Museum, which had been erected here in 1806-13, after the designs of George Dance the younger and James Lewis, and was removed for Sir Charles Barry's building, begun in 1835. The Museum has since been extended—on one occasion by the demolition, in 1848, of the old theatre, first opened by Davenant in

1662, on the conversion of the Lisle's tennis-court, Portugal-street, but rebuilt, 1714, by Christopher, father of John, Rich, and opened by the son in December, 1714. It is said to be the first of the Theatres Royal at which a guard was mounted. Six years ago the College was enlarged for purposes of the library and laboratories by the addition of two floors, raising its total height to about 80 ft., and by a widening of the front, formerly 108 ft. These alterations were carried out by Messrs. Higgs & Hill, contractors, under superintendence of Mr. S. Salter, architect; but, as some consider, at some sacrifice of the imposing effect of Barry's Ionic portico. There is also a plan, filled in with several personal memoranda, by Clift, of Hunter's home in Leicester-square. The house was No. 12 in Hunter's time, and extended eastwards to Castle-street (No. 13), thus affording space for his lecture-rooms, dissection-theatre, printing-press, and his anatomical collection, which was afterwards acquired by a Parliamentary vote of 15,000*l.* for the College of Surgeons. In the next house, at the sign of the "Golden Head," had lived Hogarth: the site, in the square's south-east corner, is now occupied by the Archbishop Tenison's School-house.

THE historical "Hansahaus" at Antwerp, which has been lately destroyed by fire, was built in 1564 from the plans of the city "architect and sculptor," de Vriendt, better known as "Floris." According to the *National Zeitung*, two-thirds of the cost of the building was subscribed by 167 Hanse cities, and the remaining third by Antwerp itself, the total outlay required being 90,000 fl. The block measured 262 ft. by 196 ft., and besides containing space for storage purposes, had some large banqueting and reception halls for the use of the guilds. On the Hanse cities losing their prestige, the building was alternately used for military quarters, as a Protestant church, and again, until lately, as a grain store. Until 1863 the building was still the property of the three Hanse cities—Hamburg, Bremen, and Lübeck. It was then bought by the Belgian Government, and, after 1881, owned by the Municipality of Antwerp.

THE "Carnuntum Association" at Vienna have published in separate form their report of the excavation and examination of the building popularly known in the district as the "Heidenthor." The name is, of course, erroneous; the structure is of Roman origin, and dates about the time of Caracalla (A.D. 211-217). It is, in effect, a *janus quadrifrons*, and makes the tenth of its sort now known. The excavations have shown that the gate still standing was the western portion of a structure which rested on four columns arranged in a square and connected by four arches; above this was a smaller structure, also with four arches. In the centre of the square are remains of a round basis. This supported a standing figure. The whole structure was, in fact, a sepulchral monument, the actual tomb being in the upper portion of the building. The writer of the report, Herr Joseph Sell, thinks that the monument was surmounted by a pointed roof, and reached to about 23 m. in height. The account is fully illustrated by views, plans, drawings of architectural details, &c.

AN interesting paper on the masons' marks on the Abbey Church of Vézelay has been sent to us by M. Adolphe Guillon, the French painter who takes so much interest in the ancient architectural monuments of France. The paper originally formed a portion of the transactions of the "Société des Sciences Historiques et Naturelles de l'Yonne," and contains several sheets of careful drawings of the ancient mason's marks on the Abbey, one of which



Masons' Marks on the Exterior of the Abbey Church at Vézelay.—(From M. Guillon's "Sigles ou Marques de Tâcherons Tailleurs de Pierre.")

we give on a reduced scale. This sheet consists of marks existing on the external walls of the Abbey. In the course of his paper M. Guillon draws attention to an exceedingly unfortunate practice, which really goes beyond anything we have heard of in our own country in the way of imitation of Mediævalism, viz., that when the church at Vézelay was restored in 1840 and 1841, and many of the old stones which were decaying had to be taken out and replaced by new ones, the masons at work on the building were authorised to copy and reproduce on the new stones the masons' marks on the old ones, a kind of falsification of history which is absolutely without excuse, as the marks on the stones had no influence whatever on the design or architectural appearance of the building, and there was not even the questionable justification of restoring the original design. As M. Guillon observes, a century hence these will perhaps be mistaken by archæologists for Mediæval masons' marks. One of the workmen at the restoration period, by name Besançon, had however established a very characteristic mark of his own, which could never be mistaken for a Mediæval one; he marked his stones with a conventional representation of a tobacco-pipe, in two or three different forms.*

* For those specially interested in the subject of masons' marks we may mention that M. Guillon's pamphlet is published at the "Imprimerie de la Constitution," 31 Rue de Paris, Auxerre.

THE PARLIAMENTARY SESSION, 1894; AND PROVISIONAL ORDERS.

IT is stated that notice has been given for the deposit of 154 Private Bills (England and Wales), showing a considerable falling off as compared with last year's total, which proved to be the lowest for some years past. Having already adverted (the *Builder*, December 9), to the London County Council's measures,* we now give a summary of the more important projects covered by the rest.

Railway Companies' Bills.—Charing Cross, Euston, and Hampstead:—More property, being three houses in Villiers and Buckingham-streets, with a block in the Strand between them, a part (east) of St. Martin's-in-the-Fields churchyard (now a public recreation ground), Nos. 5 and 7, Oxford-street (at the corner of Charing Cross-road), Nos. 118-19, New Oxford-street (adjacent to Meux's Brewery), with portion of the brewery site, six houses at the corner of High-street, Camden Town, and Kentish Town-road, other houses in the High-street (west side, between Wellington and Park streets), and other houses in Melton, Drummond, and Carding-ton streets, St. Pancras. Midland.—Widening of lines in Camden and Kentish Towns, and substituting a new street from Crowndale-road to Charrington-street, St. Pancras, for that between Phœnix and Goldington streets, authorised by their Act of 1890. Ealing and Harrow.—A line from the Metropolitan Railway at Hanger-lane to Northolt-road, Harrow. Manchester, Sheffield, and Lincolnshire.—New lines in York-

* It has since been arranged to introduce the Markets Bill into the House as a Public Bill.

shire, and powers to purchase about four acres, bounded by Cunningham-place, the Regent's Canal, St. John's Wood-road, and the Female Orphans' Home, Grove-road, St. Marylebone. Uxbridge and Rickmansworth. — A line from the Great Western branch at Uxbridge to the London and North-Western and Metropolitan Railways at Rickmansworth, passing through Cowley, Hillingdon, and Harefield. London, Brighton, and South Coast.—A line from Earlsfield to South Croydon, through Gatton, Merstham, Coulsdon, and Sanderstead. London, Walthamstow, and Epping Forest.—A line from South-place, Finsbury, through Shoreditch, Hoxton, Haggerston, Hackney, Bow, Clapton, Tottenham, Leyton, Walthamstow, Chingford, Waltham Holy Cross, Highbeach, and Epping Forest. South Eastern—to acquire land and buildings in Lewisham, Appledore, and Deal (facing the Esplanade), in Rotherhithe, Lambeth, Dartford, and Farnborough, and extend time for purchase of lands and completion of certain works in respect of the widening in Lambeth, of Port Victoria pier, and Folkestone Harbour extension (1885). London, Chatham, and Dover — purchase of Albion-wharf, Holland-street, adjoining Blackfriars Station. Great Western —new lines in the counties of Denbigh, Monmouth, Glamorgan, and Wilts, with a branch to Port Talbot; an embankment instead of Olton viaduct, viaducts and embankments in Cornwall, widening and lengthening of several bridges, and amalgamation of the Tiverton and North Devon and Oldbury Railway Companies with their own. Budleigh Salterton — line from Sidmouth Railway (Tipton St. John's) to Budleigh Salterton. Carmarthen, Pendine, and South Milford Haven — a line joining the places named. Birmingham, North Warwickshire, and Stratford-on-Avon — a line from Birmingham to Stratford, through Solihull, Tamworth, Henley-in-Arden, Old Stratford, and Shottery. North-Eastern—extension of system in Durham, North and West Ridings, Northumberland, Newcastle, Kingston-on-Hull, and York. A new line from Truro to Newlyn. The Stone, Darenth, and Swanley Railway, with a jetty on the Thames, at the river wall. Totnes, Paignton, and Torquay —through the places named on the Great Western lines. Great Northern—new lines at Finsbury Park, and a variety of minor powers. To abandon the following projects:—Shropshire Railways (1888); Hull and North-Western Junction; Brighton, Rottingdean, and Newhaven Direct; Worcester and Bromyard (1885); and the Midland Company's southern curve to the Tottenham and Hampstead Junction Railway.

Tramways.—Bills: Harrow-road and Paddington Tramways Co. extension of time now limited by their Acts of 1891 and 1893; West London Tramways Co. new lines in Acton, Fulham, and Hammersmith, and for re-incorporation; London Tramways Co., extend their system in Streatham and the use of mechanical power; Bristol, with electrical, mechanical, or other motive power. Provisional orders:—Croydon, extension of system to Streatham Hill, and from North-end to High-street (when widened); West Bromwich and Handsworth; Dudley and Wolverhampton, and from the latter to Bilston; Liverpool, Bootle, and Walton-on-the-Hill extension, with electrical power; and in West and East Hull, with steam or other mechanical power.

Rivers, Canals, Bridges, Tunnels, and Viaducts. — The Thames Conservancy promote an important measure affecting their duties and jurisdiction as extending from the river's source in Coate's Parish, Gloucestershire, to Yantlet Creek, Isle of Grain. Their Bill consolidates, repeals, or otherwise touches many existing statutes, from 21 James I., cap. 32, to the London Council (General Powers) Act of this year, and alters the present constitution of the Conservators. Of those provisions which fall within our own province we may notice the following. Extended powers for preventing pollution of the river or its tributaries, with authority to stop up and discontinue the outlets of all sewers, drains, pipes, &c., into the river, and prohibit the placing of any offensive or injurious matter on or near the banks; additional powers for inspection of lands and premises, and regulation, removal, or alteration of any works, farms, buildings, drains, and sewers; to prohibit all bodies and persons from abstracting water in excess of authorised quantities, and control the taking of water by requiring the fixing and maintenance of gauges; to free from tolls and charges and open to the public all piers belonging to the Conservators; for authority to board and inspect all vessels, including house-boats, and to inspect all vessels with a view to the prevention of pollution and the discontinuance of the flow therefrom into the river of sewage or any other offensive or injurious matter, whether solid or fluid, or water, and to require the making of such alterations and improvements, with the providing of such sanitary fittings and appliances, as they may deem expedient, also with power to prescribe the pattern or description of work needed; the carriage of explosives; removal and disposition of structures and obstructions; to regulate the drawing down and keeping back of water in locks, mills, and other works; removal of accretions or accumulations of mud, weeds, and other matters; regulation of bathing; to prohibit or regulate the exhibition of advertisements and placards and advertising in any form whatever on the river, and also the placing or erection of advertisements, disfigurements, hoardings, or notices on the banks;* to reclaim the foreshore from Teddington Lock downwards; and for general powers to the Conservators, and the London and other County Councils, to cleanse, scour, deepen, straighten, or otherwise improve all tributaries, streams, and water-courses that communicate directly or indirectly with the Thames. Appointment of Commissioners for cleansing and purifying the Brent river and its tributaries, the Silk stream, Dollis, Mutton, and other brooks; and enforcement of the Rivers Pollution Prevention Act, 1876, by the West Riding Rivers Conservancy. Sale and transfer of the undertaking of the Leicester and Northamptonshire Union and Grand Union Canal Company to the Grand Junction Canal Company. Flintshire County Council—for a movable bridge across the Dee at Queen's Ferry, with other powers (see also for Cambridge, below). The Channel Tunnel promoters seek for further powers to continue their experimental works, whilst the Channel Bridge and Railway Company propose first to ascertain and determine the practicability of their project, and then to submit its accomplishment to the decision of the Treasury. Their viaduct is planned to start from the Dover and Deal line to St. Margaret-at-Cliffe at a point 475 yards E.-N.-E. from the Low lighthouse, South Foreland, and thence seawards.

Docks, Harbours, and Piers. Bills:—Surrey Commercial Docks — dredging the Thames, enlarging their Greenland and Russia docks, with new canal-locks and entrance from the Grand Surrey Canal into Greenland Dock; a pier about 600 yds. long at Eastham and a jetty at Runcorn by the Manchester Ship Canal Company†; a pier, about 1,550 ft. long, from Garth-road, Bangor, together with sundry local improvements, by the Corporation; transfer of Ryde Pier to the borough, with various improvements; enlargement, by four and a-half acres, of the dock by the Swansea Harbour Trustees; and improvement of the Bute Docks. Provisional Orders for promenade pier and extension of the east jetty, Littlehampton; improvement of foreshore and dredging Poole Harbour; new pier at Seaford; new pier at Yarmouth, to extend about 500 yds., from opposite Trafalgar-square; a pier, with pavilions, baths, aquaria, &c., by the Abergele and Pengarn Pier Co., Denbigh. A committee appointed by the Corporation in respect of the Cardiff Harbour Trust have formulated a scheme for acquiring the Bute, Penarth, and Barry Dock properties, with all the foreshore off Cardiff between Penarth Head and Rumney river. Port Talbot Company's — re-incorporation, definition of the port and harbour limits, making a pier or breakwater, about 330 yds. long, from the seaward end of the existing pier, Port Talbot, in Aberavon, and another, about 530 yds. long, from Port Talbot lock, with a dock (330 yds: by 198 yds.) and entrance lock; for various railways to communicate with the Great Western line (see above), and running powers over portion of the Rhondda and Swansea Bay line, these two companies to be empowered to subscribe towards the intended works and to take shares in the capital.

Municipal (including Drains, Sewers, Local Improvements, and Open Spaces). — Bills for transfer to and vesting in the united vestry of St. Margaret and St. John, Westminster, the properties, duties, &c., of the Burial Board for those united parishes, the Commissioners for Public Baths and Wash Houses, and the Commissioners for Public Libraries and Museums; and transfer of the freehold of Westminster Town Hall, which is now vested in the churchwardens and overseers; extension of time within which the Board of Trade may authorise exercise of powers under the Westminster (Parliament-street, &c.) Improvements Acts of 1887, 1890, and 1892; various local improvements by the Corporations of Gloucester, Cardiff, Bury (with new sewers and sewage works, waterworks, and pleasure grounds), Nottingham, Grimsby, Liverpool, with extension of city boundaries to include, and abolish, the district local boards of Walton-on-the-Hill, West Derby, Toxteth Park, and Wavertree; Doncaster Corporation, to keep open for ever, unenclosed and unbuilt over, a portion, about ninety-five acres, of the Town Field; and Cambridge Corporation, for the removal of the University jurisdiction and amendment of the law in respect of theatres and public entertainments, revival of powers to construct bridges over the Cam, and power to enclose Jesus, Butt, and Midsummer Greens; Scarborough — a company to construct a tunnel, 2 furl. 5 ch. long, from Foreshore-road (south side) northwards beneath the town to Royal Albert Drive, at North Bay, thus joining the South and North Sands.

Electrical Light, Energy, and Power.—Application is proposed to be made to the Board of Trade for Provisional Orders to produce, store, and sell electricity by Kensington and Camberwell Vestries, Crystal Palace District Electricity Supply Co. (extension of area), Holloway Electrical Supply Co. to light Guildford; Harrow, and Leyton Urban Sanitary Authorities; Veale & Co., Ltd., to supply St. Austell; Shropshire Electric Light and Power Co. to supply Shrewsbury; the Corporations of Wakefield, West Hartlepool, Barrow-in-Furness, Grimsby, St. Helen's, Chesterfield, Peterborough, Bournemouth, Monmouth, and Plymouth; Crompton & Co. to supply Chelmsford and Swansea; St. Austell Electric Lighting Co. (enlargement of works); Local Boards of Penrith, Buxton, Yeadon, and Willesden; Bedford Electric Light Co. to supply the borough and for new works; Birmingham Electric Light Co. to supply the district, and for similar services in Oswestry, Uttoxeter, and Aberdare; The Plymouth and Stonehouse Gas Light and Coke Co. ask for an Act to the same intent. We may here observe that the Electric Powers (Protective Clauses) Joint Committee for the current session reported that the Board of Trade should make fresh regulations for protecting the electric circuits of other parties and the pipes of gas and water companies, &c., in the case of statutory powers being granted for the use of electricity by tramway and railway companies.

Gas and Water Companies. Bills: "Southwark and Vauxhall"—new reservoirs at Hampton, Sunbury, and Camberwell (Homestall-road), and cognate purposes; East London — additional storage, reservoirs, &c., in Tottenham, Walthamstow, and Hackney; a gas and water board for Accrington, Rushton, Clayton-le-Moors, Great Harwood, and Church (all in Lancashire); Gloucester Corporation — new waterworks, the water to be brought from Oxenhall into the city near the Cross; Barnsley Corporation — extension of area for service; Chesterfield Waterworks and Gas Light Company — new reservoirs and works; Swinton Local Board —the well and pumping station to be at Thomas-street, within the lordship; Provisional orders by the Bishop's Waltham Waterworks Company, for Blandford; Tilehurst, Pangbourne, and the district; Bury, and Cardiff (water).

Miscellaneous. — Crown Lands: an Act to change and extend the powers of the Crown Lands Act, 1866, and alter the Crown Lands (Scotland) Act, 1835, in respect of the granting of lands; and to transfer from the Archbishop of York (or his successors) and the Woods Commissioners, to the Ecclesiastical Commissioners the Sunk Island Chapel in the River Humber, together with all existing trusts connected with that chapel, the parish church, Newborough, Northants, and Portland, Oxford, and Welbeck Chapels, London. The Common Council promote a Bill which concerns, more or less, all inhabitants or owners in the City; they propose that the City of London Police shall be entitled to claim pensions after twenty-five years' service, irrespectively of age, and to prohibit or restrict all assignments or charges upon superannuation allowances. The force consists of 1,050 constables, their pay is 91,085*l.* a year, and pensions 13,593*l.*

* We commend this portion of the Bill to the notice of the "National Society for Checking the Abuses of Public Advertising."

† The Canal will be opened on January 1 from Eastham to Manchester, thirty-five miles, with a procession of vessels headed by the sailing-ship, *Sophie Wilhelmina.*

PROPOSED SCHOOLS, BURSLEM.—The Burslem School Board are about to build a new school at Jackfield, for 800 children, for which plans are being prepared by Mr. R. A. Wood, of Tunstall.

Illustrations.

HOUSES ON THE GROSVENOR ESTATE, BUCKINGHAM PALACE-ROAD.

THE drawing shows the elevation of a row of houses in course of erection by Mr. Willett, ten of which have been recently completed. The material is red brick, with the porticoes, balconies, and dressings in Portland stone. The ground and second floors are constructed with fireproof materials. The houses have the usual accommodation, disposed so as to give ample light and air throughout. The aim in the elevation has been to give individuality to each house in conformity with the general design.

The architect is Mr. J. J. Stevenson, who has done so much towards the improvement in recent years of the treatment of London street houses. The drawing was exhibited at the last Royal Academy Exhibition.

THE STAIRCASE WINDOW AT "RIVINGTON," PENDLETON, MANCHESTER, FOR MR. ALFRED PILKINGTON.

THE constructive framework of this window, as well as all the adjacent arches, pillars, pilasters, and strings, is of red terra-cotta, which makes an admirable setting for the glass. The general idea of the subject is Mr. Pilkington's. Then sketches were made by Messrs. Heaton's draughtsmen. These sketches, after criticism and correction by Mr. Pilkington and his architect, developed into the full-size cartoons, which, after a like process of revision and correction, were put into glass.

The design may thus be considered as that of Messrs. Heaton, Butler, & Bayne, subject to the criticism and revision of the architect, in whose name the drawing was exhibited at the last Royal Academy exhibition.

DECORATIONS IN THE STEAMSHIP *GOTHIC*.

THE degree of trouble and expense gone to in these days in the interior fitting of first-class passenger steamships is a remarkable contrast to what used to satisfy the last generation; and it is gratifying to find that in some instances at least there has been an attempt to be artistic as well as sumptuous. The illustrations we give of the work carried out in the *Gothic*, a recently completed vessel, by Mr. J. Aldam Heaton, form only a very small portion of the amount of decorative work, all of a good class, which has been lavished on the interior of this ship.

We give illustrations of the friezes of the smoking-cabin and library, of some carved panels in the library, and of some of the marquetry work on the fronts of the book-cases.

QUEEN'S HALL, LANGHAM-PLACE.

WE have referred already to the fact that there has been a dispute between Mr. C. J. Phipps and Mr. T. E. Knightley as to which had the claim to be called architect of the new concert-hall in Langham-place. They prepared the design jointly in the first instance, representing separate promoters but agreeing to work conjointly, Mr. Phipps preparing the plan and Mr. Knightley the elevation. Mr. Phipps's client eventually dropped out of the concern, and Mr. Knightley became architect for the building, which in plan was carried out mainly on Mr. Phipps's scheme. Mr. MacVicar Anderson has published his award; we cannot find space for it in detail, but the summary is—"That, subject to a few variations, the building known as the Queen's Hall, Langham-place, has been erected from plans, as distinguished from elevations and sections, which were designed by Mr. C. J. Phipps, and that the design of the exterior and interior in other respects, as well as the successful completion of the hall, is due to Mr. T. E. Knightley, under whose sole superintendence the building has been carried out."

On the facts as recorded in the award, we quite concur in the decision.

THE SLATE TRADE.—Prices for the coming year have been arranged. In both the Carnarvonshire and Merionethshire quarries they have a strong upward tendency, especially for small sizes. In spite of the depression in other trades, demand is good and likely to continue so as the leading quarries have orders in hand for some months to come.

THE HORNIMAN FREE MUSEUM.

THIS interesting museum, which is situated in the London-road, Forest Hill, was re-opened, after re-arrangement and extension, on Bank Holiday. The museum consists of twenty-two apartments, and contains many objects of interest and value which Mr. F. J. Horniman, its founder, has been collecting for over thirty years, and which he exhibits free to the public on Mondays, Wednesdays, and Saturdays.

In the Reception-room, amongst other notable objects are a fine Japanese cloisonné enamel vase from Nagoya, which is 5 ft. in height by 7 ft. 6 in. in circumference, and some good decorative panel-work. In fact, in the applied art section of the museum much panel-work is shown, including examples of metal-work, ivory inlaying, and lacquer, while some curious and clever pieces of wood and oak carving are to be seen. Room 4, an Elizabethan bed-room, has been furnished entirely in the old English style, with carved oak bedsteads and cabinets, and broad chimnied fireplace, while on the walls are paintings in imitation of tapestry, representing Old London Bridge. A case in this room also contains some old English locks, keys, &c., and in the next chamber are some specimens of old German wood-carving. A collection of musical instruments is contained in the museum, including an automatic orchestral organ, which on Tuesday was kept "going," presumably for the benefit of the holiday public—a favour which, we are inclined to think, many of them could have dispensed with, inasmuch as the walls of the apartment containing the instrument are not sound-proof, and the monotonous repetition of tunes could be heard in different parts of the building.

Amongst other interesting rooms are the Old English Parlour, the Oriental Figure Room (containing several life-sized figures, clad in picturesque Oriental dresses, but shown in an inadequately ventilated and pokey apartment, with a sloping roof, and therefore not to be seen with or to advantage); the Gallery of Antiquities (with Græco-Roman bronzes and terra-cotta figures; Cyprian pottery and glass found at Paphos, and a series of plaques restored from the Phigalæan and Parthenon friezes); the Ancient Urn Room (containing Græco-Roman mosaics), the Egyptian Mummy Room, Indian Rooms, and the Oriental Gallery. In the Indian rooms are shown fans, lacquer, cloisonné enamel, wood carvings, gold, silver lace, models in wood and clay, &c. On the walls of these rooms are large panels of Japanese embroidery. The Oriental Room, principally devoted to examples of Oriental Mythology and Pantheon, contains large and small-seated figures of Buddha; Buddhist shrines; a model of a Japanese Buddhist priest, and numerous Indian divinities, the elephant-headed Ganesa, the god of Prudence, and a wooden idol from the Nicobar Islands. There are also some examples of Indian and Bidri ware, inlaid silver or pewter.

At the entrance to the Museum from the back is a fine carved Indian archway from Jeypore, which is said to have occupied six men more than seven years in continuous labour. It is an elaborate piece of work, but, unfortunately, perhaps owing to its size, it has been placed where it needs to be protected from the elements, and with this object in view a light-glass framework has been placed over it, spoiling its effect from the outside, where the combination of elaborate Indian carving and cheap English glazing looks absurdly incongrous.

Most of the other rooms are devoted to Natural History objects. In the Ethnographical Saloon there has been added a collection made by Sir Somers Vine, who opened the building on Tuesday.

The Museum is an interesting and instructive one, and we hope that it will be largely attended by the public of the South-Eastern district of London.

THAMES BRIDGES.—The Highways Committee of the Middlesex County Council have been instructed to enter into fresh negotiations with the Surrey County Council with the view to reopening the question of the condition of Kew Bridge consequent upon the extreme narrowness of the roadway and of the pavement, which is alleged to be a source of great danger to the public. It is understood that the London County Council will also be appealed to, it being contended that the cost to be incurred in widening, or otherwise improving, the bridge, is likely to be a very large one, and that after all the present inconvenience and danger is in a great measure due to the enormous traffic coming from the City of London. A proposal to widen Kingston Bridge is also under discussion.—*Morning Post*.

COMPETITIONS.

THE GAMBLE INSTITUTE, ST. HELENS.—At the meeting of the Gamble Institute Committee, held at St. Helens on the 20th inst., it was decided to engage Messrs. Briggs & Wolstenholme, of Blackburn, to whom the assessor for the premiums awarded the second prize for the designs of the new Technical Schools and Free Library, as the architects to carry out the execution of the new buildings.

NEW BUILDINGS IN THE OLD SQUARE, BIRMINGHAM.—As the premises of Richard Lunt & Co, Limited, in Moor-street, Birmingham, will be required by the London and North-Western Railway Company, in connexion with the projected new tunnel into New-street Station, and the business in consequence having to be removed, the directors have taken on lease the site of the Winter Gardens in the Old-square, containing an area of 2,267 square yards. As the new building is to be of considerable magnitude, and to occupy an important position, the directors invited architects to send in plans in competition, and they received fifteen sets, from which they selected, with the assistance of Messrs. Harris & Harris, architects, three sets. The directors then called in Mr. Thomas Naden, architect, to make the final selection, and his decision was given in favour of set No. 5, which, on the envelopes being opened containing the names of the competing architects, was found to be that of Messrs. Essex, Nicol, and Goodman, and they have, accordingly, been instructed to proceed with the work forthwith. The new block of buildings will have a frontage of 119 ft. to the Old-square, and a depth of 171 ft.

ARCHITECTURAL SOCIETIES.

LIVERPOOL ARCHITECTURAL SOCIETY.—The Liverpool Architectural Society are continuing the classes for students during the present Session as in the past. The various lectures are framed on the lines set forth by the Royal Institute of British Architects, and are intended as a preparation for the Institute Examinations, the subjects and lecturers being:—"History of Architecture," Mr. T. Taliesin Rees, A.R.I.B.A.; "Mouldings, Features, and Ornament," Mr. C. E. Deacon, F.R.I.B.A.; "Building Construction," Mr. J. W. Blakey, A.R.I.B.A.; "Sanitation," Mr. T. Harnett Harrisson, F.R.I.B.A.; "Quantities and Specifications," Mr. H. L. Beckwith, F.S.I.; and "Theoretical Mechanics and Strains," Mr. R. J. Angel, A.R.I.B.A. Mr. C. W. Harris has been awarded a prize for the best work done during the last Session.

LEEDS AND YORKSHIRE ARCHITECTURAL SOCIETY.—On the 18th inst., at a meeting of the Leeds and Yorkshire Architectural Society, Albion-place, Leeds, Mr. F. W. Troup, of London, delivered a lecture on "The Use of Seconds." Mr. G. B. Bulmer presided. In the course of his remarks the lecturer observed that there was a class of bricks principally manufactured in Leeds—glazed bricks. When made white they were prized for their reflective value, and when coloured were used decoratively. A wall of pure white bricks looked deathly cold. If some of the seconds, or discoloured bricks, were used, the effect would be warmer and more pleasant. Leeds was smoky, and he could not think why architects did not use glazed bricks more freely than was evident from the Leeds buildings. He had seen some in large insurance buildings, and there was a vast array of white bricks in the new Leeds Post Office. Those, however, were put in by outside architects. Could it be that bricks, like prophets, were not valued in their own country? In moving a vote of thanks to the lecturer, Mr. Dodgshun said with regard to glazed bricks that the seconds would not wear. It was absolutely necessary to have a perfect glaze.

CARLISLE ARCHITECTURAL, ENGINEERING, AND SURVEYING ASSOCIATION.—A meeting of this Association was held on the 20th inst. in the Town Hall, Mr. Higginson presiding. Mr. Lees, Head Master of Carlisle School of Art, gave a lecture on "Ornament," both historical and artistic. With the aid of diagrams he traced the rise and development of ornament among the Egyptians and Greeks, and explained the symbolic nature of Egyptian ornament. The lecture was illustrated by paintings and drawings.

NEW BOARD SCHOOL AT KEIGHLEY.—The Holycroft new infant school, Keighley, was opened recently. The new structure, planned by Messrs. W. & J. B. Bailey, provides places for about 480 infants, at a cost of 4,000*l*.

ENGINEERING SOCIETIES.

THE JUNIOR ENGINEERING SOCIETY.—At the last meeting of this Society, held at the Westminster Palace Hotel, Mr. Percy Waldram in the chair, a paper was read by Mr. S. Cutler, junr., on "Coal Gas Manufacture and Recent Improvements of the Plant employed therein." Commencing by showing how rapidly the demand for gas had increased since its introduction, the author proceeded to briefly describe the usual processes of gas manufacture, passing on to a detailed account of the recent improvements which had been adopted; the inclined system of retorts to obtain automatic charging and drawing, the latest forms of condensers and purifiers, compressed air, hydraulic and rope power machinery for working horizontal retorts, water-seal valves, water gas plant, and other features being dealt with. Of gasholders, that at Kensal Green of 8,000,000 cubic ft. capacity, and another of 300 ft. diameter, semi-columnless, at East Greenwich were described. In conclusion, the cost of manufacture, by-products, the future of gas considered in respect to electricity, and gas employed as a heating agent were touched upon. A discussion followed the reading of the paper, Messrs. H. Fraser, H. Cook, S. Cutler, senr., W. Tennant, S. Boulding, and others taking part.

LIVERPOOL ENGINEERING SOCIETY.—The fifth ordinary meeting of this society was held at the Royal Institution on the 20th inst., Mr. H. Percy Boulnois, M.Inst.C.E., President, in the chair, when a paper entitled "A Tour in South Africa, with reference to Engineering Work, Past and Present," was read by Mr. G. L. Burton, Assoc. M.Inst.C.E. After a brief outline of the history and a short reference to the towns, harbours, and rivers, the author devoted his remarks to the railways, the diamond-fields, and the gold-fields. The first Act for railways was passed in 1857, although the first line was not actually opened until 1863. From then, until about 1875, little progress was made in the way of railways, mainly, perhaps, because up to this point they had been built by private contract. About this period, however, the Government bought all existing lines and continued all extensions. The original gauge of the lines, as built by private enterprise, was 4 ft. 8½ in. After the purchase, however, by the Government, this was altered, and all further extensions made to 3 ft. 6 in.—a fact which is now much regretted by all leading men in the colony. In Natal the railways have been pushed forward with greater difficulty, owing to the fact of its being a Crown colony, and, therefore, not master of its own destinies.

Books.

The Dynamo: its Theory, Design, and Manufacture. By C. C. HAWKINS, M.A., A.I.E.E., and F. WALLIS, A.I.E.E. London and New York: Whittaker & Co. 1893.

IT is almost inevitable that a text-book dealing with any rapidly advancing branch of knowledge should be, in however small a degree, out of date almost as soon as it is published. With such a subject as the dynamo, this danger is exceptionally great. Not only is its development rapid, but the subject is so large, that any adequate treatise on it must needs take a considerable time to write.

Moreover, it rarely happens that the authors of such text-books are themselves actually engaged in the development of the machine of which they treat; they are almost invariably professors rather than engineers, men who know the dynamo very intimately in the laboratory, but very distantly in the drawing office and workshop. The contrast between the elaborate formulæ and complex mathematics of the professor and the simple methods of calculation developed by the engineer is too well known to need even a passing comment. "I had no idea a dynamo was so complicated; it is enough to make one give up making them," we heard a witty manufacturer say, as he glanced over the pages of a technical treatise on the subject—not, we must add, the one now before us, of which, indeed, he spoke very highly.

"We lay no claim to originality," say the authors in their preface," (save on certain definite points, such as the "construction of equations for magnetic leakage, for the heating of dynamos, or the E.M.F. of alternators), yet we do claim a certain novelty in our method of treatment by which these facts are presented." The passage is a fair, if compressed criticism of the book. It is this novelty of treatment, which differentiates the present volume from others of the kind, and makes it impossible to gauge its value merely by comparison with some standard work.

The authors, unlike the self-styled practical man, evidently possess a sound knowledge of the science of electricity, or, at least, of such a part of it as they deal with; unlike the mere laboratory teacher, on the other hand, they know the dynamo as manufacturers know it.

The introductory chapter gives us a favourable impression at the outset; there is none of the too-common confusion between "force," "power," and "energy," and the authors, mindful of what the reader has probably been taught elsewhere, devote some space to explaining to him what these things are *not*. The "magnetic field" is next considered, and lines of force are ingeniously traced by a long thin magnet with one end thrust through a cork, so that it floats vertically with the upper pole just level with a bar magnet whose horizontal field is being investigated. By some strange oversight, the authors, seemingly forgetting that they are using one pole only of the floating magnet, say, "our exploring boat would start moving from any place near the magnet (except just *at its centre, where there is no magnetic force*)." The italics are ours. If this were so, the lines of force would be discontinuous at the centre of the magnet. This strange error might easily puzzle a thoughtful beginner, and should certainly be corrected in the next edition.

Little need be said about the next few chapters. Their subject-matter may be found in any sound text-book on electricity and magnetism, though not, perhaps, so fully illustrated. The formula $E = 10^{-\frac{gz}{t}}$ is merely stated, though it might easily be proved, while over elaboration rather obscures than elucidates the simple and sufficient knowledge that the E.M.F. set up in a moving conductor is dependent only on the rate of cutting lines of force.

Self-induction is the *pons asinorum* of many an electrical engineer. The chapter that treats of it is well worth perusal.

At a meeting of the Institution of Electrical Engineers, Mr. Harrison was unorthodox enough to criticise Dr. Hopkinson's way of graphically showing the effects of self-induction. He stated that the only rational thing to do was to regard self-induction as E.M.F., and to draw the curves accordingly. From the start the authors keep this view before the readers. In a circuit they consider: "(1) The *impressed* E.M.F.; (2) the E.M.F. of *self-induction*; (3) the *resultant* E.M.F., which immediately causes the flow of current, and the value of which at any moment is the algebraic sum of the values of the other two." Certain circuits are considered and the results obtained, clearly explained by means of curves.

A little further on comes a chapter which might well be placed earlier in the book, viz., that on the "Magnetisation of Iron." It admirably summarises the broad results of the researches of Hopkinson, Ewing, and others.

It is no easy matter to classify dynamos satisfactorily, and the authors have hardly solved the problem. The Uni-polar dynamo, in the original sense of the words, exists now only as a historical curiosity. The authors first give a new meaning to the expression—a thing always to be avoided if possible—so as to include some few real machines (though most of those elaborately described exist only on paper), and then promote their fond invention to the dignity of first place as "Class 1." There is a whole chapter, too, devoted to uni-polar alternators, some of which, as the Mordey alternator, have more than a dozen poles. We regret that the authors should give their countenance to the unhappy suggestion made some time ago to restrict the term "dynamo" to direct current machines. The use of iron core in armatures and the reasons for laminating it are very elementary matters, but they are well and clearly put for the benefit of beginners. Armatures are next dealt with, and their classification is much more satisfactory than that of dynamos. Especially good is the account, or rather the evolution, of open coil armatures.

After a practical chapter on the construction of armatures come two chapters on "field-magnets;" in the first of these, such matters as the form of the magnets, so as to waste as little energy and copper as possible in maintaining the induction, the question of undertype or overtype machines, throttling, &c., &c., are considered; in the latter, calculations for the ampere turns of the field. Next we have a chapter on series, shunt, and compound winding, which is not overburdened with calculations, stress being rather laid upon the principles which should guide the designer. The student here is first made acquainted with characteristic curves, which are to the dynamo what indicator diagrams are to the steam-engine.

Lifting the brushes of a shunt machine on open circuit is an experiment dangerous alike to the machine and the experimenter, nor is it to be advised even on closed circuit. Perhaps this is why so few writers seem to know exactly what would happen. Our authors say, "if the machine be running on a closed circuit, say, of incandescent lamps, the person would be less liable to receive so severe a shock, since the so-called 'extra current' is discharged through the external circuit, and causes the lamps to momentarily flash up." This is quite true if there are so few lamps that the current in the fields is greater than that in the external circuits; otherwise the lamps would not flash up. Of course, the momentary current in the lamp circuit due to the self-induction of the fields is in the opposite direction to that before the brushes were lifted.

It is needless to say much on the chapter on "Sparking and the angle of lead," the treatment is quite orthodox, but there is little opportunity here for originality, even in manner of presentation. "The heating of dynamos" is very well handled; we find additional evidence of the superiority of America over Europe in matters electrical, of which we have heard so much lately, in the sentence, "In the United States dynamos are frequently worked at considerably higher temperature than would be tolerated in England." The "description of typical dynamos" is the only chapter that at all suggests "paste and scissors." Dynamo-designing can hardly be taught on paper, but the concluding chapter on "working and management of dynamos" contains many excellent and practical hints.

In conclusion, the student into whose hands this book falls must remember that he will not, in practice, be called upon to classify dynamos, but to understand and readily grasp details, to carry out tests, and to show intelligence and promptitude in cases of emergency. He must recognise that he has but half learned to read unless he has learned to skip, and he should not waste his time reading several pages to show that two halves of armature must balance. It is sufficient for him to get hold of the principles on which the mathematical calculations here given are founded, not to follow out all the calculations exactly, that is, if he is training to become an engineer. If he only wants to pass an examination, his course will be very different, but then he had better consult some other book.

A Manual on Lime and Cement, their Treatment and Use in Construction. By A. H. HEATH. London: E. & F. N. Spon. New York: Spon & Chamberlain.

THIS manual, compiled from many sources, is in many respects a good one, not merely for the students at the Royal Indian Engineering College at Cooper's Hill, but for builders in general. We fail to detect any omission of primary importance, though doubtless the desire to produce a low-priced work has had much to do with the entire absence of illustrations. It is, however, impossible for a student to follow descriptions of kilns and their parts, of mixing and testing machines and other apparatus without explanatory diagrams, and it would also have been well to have included in a manual sets of reliable tables of results obtained in the testing of the two materials treated of, both singly and in combination with other substances. Of course a good deal is said in the text about this, but condensed information is often of the greatest practical value to men of business, who as a rule want references handy and simple, and are not concerned to work out calculations if they can get this branch of work sufficiently well done by others. In such respects a manual need not necessarily clash with a handbook or with a price book.

Starting with some definitions, the author then proceeds to slightly notice the localities and natures of some of the limebearing rocks (including chalk) which are known in Great Britain, and then launches into the manufacture of Portland cement, which is very thoroughly treated—more so, in fact, than that of the manufacture of lime. Equally thorough is the chapter on the various tests to which Portland cement should be subjected, but the differences in the stresses per square inch at various dates (see page 84) for neat cement briquettes and cement-mortar briquettes respectively are not sufficiently explained, nor is the composition of the mortar given. We note, and cordially agree with a conclusion at which

the author has arrived, viz., the fallacious nature of the weight test for Portland cement, for it would be far better to omit from specifications any mention of weight per bushel. Especially interesting is the section devoted to the hot water-bath, as the best means of overcoming the objection to the use of mortar briquettes for testing cement for tensile strength; the length of time, usually twenty-eight days, which has to elapse before the test can be applied, being most inconvenient. Hot water in place of cold water immersion reduces the twenty-eight days to six. It should, however, have been noted that it would frequently be very difficult to arrange for the maintenance of a uniform temperature in the bath for several days of 176 Fah. It is unquestionable that the actual strength of mortar for use in building is far more satisfactorily ascertained by testing mortar briquettes than by testing heat cement briquettes.

The author tells us how to restore the vitality of damaged cement, which may be useful and necessary for remote districts, but his advice that it should not be kept more than three months without being used is probably discreet. In testing for fineness of grinding, it would be well, as the author suggests, to pay a little more attention than is usually the case to the fineness or guage of the wires in the sieve, and not rest contented with merely specifying the number of meshes per square inch. There is a great variation in this respect, and the German rule of the diameter of the wire being one-half the side of the mesh opening would be a good one for general adoption. Not the least valuable part of this section of the work is the description of such tests as can be applied without the use of the tensile testing machine and moulded briquettes, tests of a description which are, indeed, sometimes, but by no means always, known by those who are prone to style themselves "practical men." The modes of making mortar and concrete are duly and carefully described, but present no especial features for criticism. This manual forms, on the whole, a very commendable addition to the collection of technical works required by those who are concerned to build with economy and with skill.

Théâtre Flamand à Bruxelles, par Jean Baes, Sous-Directeur de l'École des Arts Décoratifs. Brussels: E. Lyon-Claesen.

The number of publications describing individual modern opera-houses or theatres of importance is small; the cost of bringing out books of this kind is so high that the price has to be a prohibitive one for the majority of architects, and their market is thus limited to libraries and public institutions. Since M. Garnier's excellent plates and letterpress describing the Paris Opera House, the only similar publication of note has been Herr Auer's illustrating Messrs. Van der Nüll and Von Siccardsburg's new Vienna Opera House; while the new "Flemish Theatre" at Brussels, designed by M. Jean Baes, published at M. Lyon-Claesen's *atelier*, is perhaps the first small theatre which has been thus illustrated. In some sixteen excellent plates M. Claesen has reproduced the architect's drawings, which were recently to be seen on the walls of the triennial Belgian *Salon*, together with some photographs of the building, and this combination makes the volume even more valuable than the reproduction of drawings only, as has been the case in Paris and Vienna. The reproductions of both drawings and photographs are exceedingly clear, and the scales to which they have been prepared allow the student to become thoroughly master of the work shown, without the usual strain on his eyes. In some ten folio pages the publisher describes the history of the building, and the principles upon which the architect planned it. As a supplement he adds a chromo-lithograph of the proscenium curtain, which was specially designed by the architect.

The theatre described has been erected on a site open on all four sides, measuring 56 mètres by 25 mètres, or some 180 ft. by 80 ft. The auditorium has four tiers, but the stage is only a comparatively small one. The erection of the theatre, which had a difficult foundation, took three years. Herr Baes' conception of the plan dates from 1883, *i.e.*, after the Ring Theatre fire, but previous to the Paris Opéra Comique catastrophe. The theatre regulations at Brussels were not stringent at the time—in fact, their present purport is due mainly to the example set by M. Baes in the careful planning of his theatre.

As regards the plan of the theatre there is little to say, excepting that the architect was much hampered by the narrowness of the site, which prevented his finding ample staircase accommodation, and caused him to design an elaborate system of exterior balconies to lessen the risk of loss of life by panic or fire. This system of balconies, which gives the whole structure its individuality, is certainly one of the best makeshifts, but unfortunately it will always have to be classed as such—*i.e.*, *a makeshift*—and rank lower than any good scheme of interior staircases. Emergency exits of any kind, even if they lead direct on to a balcony, can never be so strongly recommended as the perfect arrangement of the ordinary routes of egress. If perfect in themselves they may form a valuable auxiliary in case of emergency, but they should be counted as auxiliaries *only*, and not as necessities, as in this case, where the staircases alone cannot be termed model ones.

The Colliery Manager's Handbook. By Caleb Pamely. London: Crosby Lockwood & Son.

It is probable that the underground worker, who has been so much in evidence of late, has little conception of the immense amount of laborious study necessary, or of the wide range of subjects which must be taken in hand, before the student can hope to master the *science* of mining. The career of the late Sir George Elliott affords a striking proof of the value of combining science and theory with the practical work of the mine; but the average miner makes use of the appliances, and trusts himself to the machinery devised by the engineer and the man of science, with but a dim idea of what has been involved in the attainment of their knowledge. Certainly the general public would be surprised to find a work modestly described as a handbook, comprising considerably over 600 pages, and dealing with some half a score distinct branches of science, devoted to an industry of this nature.

The student of coal-mining may certainly consider himself fortunate in having access to a work of so comprehensive a character as this. Everything bearing upon the subject, both in theory and practice, appears to be exhaustively treated, the reader being conducted, above ground and under ground over the various coal-fields of this and other countries, with an occasional excursion to gold mines and oil-fields. The consideration of explosives and blasting operations introduces us to many particulars concerning the nature of the nitro-compounds which are just now associated in many minds more with anarchy than with coal-mining. The illustrations are very numerous and well executed, though it may be remarked that, besides assisting the reader, they appear calculated to form excellent advertisements for some of the firms whose machinery and appliances receive prominence. We notice a large number of elaborate and carefully-expressed calculations, and "questions and answers" in various branches of the subjects treated form a prominent feature. Much of the information given in the engineering sections might prove almost equally valuable to young men preparing for occupations other than mining; while interspersed among the technicalities with which the work necessarily abounds, may be found information regarding life underground which is not without interest to the general reader.

Factory Accounts, their Principles and Practice. By E. Garcke and J. M. Fells. London: Crosby Lockwood & Son.

Industrial legislation proceeds at such a pace in these days that it must be somewhat difficult for proprietors and overseers of factories to keep up with it; and it appears likely to become increasingly embarassing to all employers of labour. The authors of "Factory Accounts," in their preface to the fourth edition of this useful work, remark that it has been brought as closely as possible up to date, and we observe that there is much new information in a condensed form regarding the later Factory and Workshop Acts. Should a further edition be called for, "Employers' Liability" will probably claim a place—unless, indeed, it should be deemed to open up too wide a field. The present Bill has been described as one which will provide plenty of work for the lawyers, and it will certainly exert some influence upon the accounts of many factories and various industries hitherto making their own arrangements in regard to this matter; probably raising some complicated questions in the case of industrial partnerships and other co-operative concerns. The general scope of this work was commented upon in the *Builder* on the publication of a previous edition,* and its reappearance in its present enlarged form affords evidence of popularity and usefulness.

* Page 308 (January to June, 1890).

Cottage Sanitation. By Hector Maclean Wilson. With a preface by T. Pridgin Teale, F.R.S. Published by the Royal Agricultural Society of England. London: 1893.

This is a paper embodying the views of a few gentlemen, medical officers of health and others, who met at the house of Mr. Pridgin Teale in October of last year to consider the drawing up of some simple suggestions as to the sanitary requirements of country villages. The book is little more than a pamphlet in size, of twenty-four pages, and has evidently been purposely got up in a cheap form to bring it within everyone's reach. It is, however, an admirable summary of the subject, illustrated by diagrams where necessary, and if it were largely read and acted upon the reports to the Local Government Board in regard to the condition of rural sanitary districts would be less melancholy reading than they generally are. Dr. Poore, who writes on the subject of dry closets on another page of this issue, would perhaps suggest some improvements in the construction of privies as indicated here; but in the main the suggestions are such as all sanitarians will be agreed about. The sections illustrating the manner in which wells may be fouled are most significant, if one can get those most concerned to understand them—that is the difficulty.

Méthode Pratique de Dessin, à l'Usage des Aspirants aux Écoles du Gouvernement. Par L. Rapilly & L. Villette. Paris: Pierson et Cie. 1893.

This is one of the numerous small books which have been written with the object of making plain to a beginner the problems of perspective and foreshortening, and is one of the best we have seen. The instructions are brief, clear, and practical, and the illustrations admirable. The object of the whole book (an octavo of 48 pages) is to give a kind of general outline of the meaning of the art of drawing, and what it endeavours to accomplish; and this is so clearly done that a clever student might make a great deal of progress for himself merely on the basis of what he will learn from this small book. It might be worth translating into English.

TRADE CATALOGUES.

The Threlkeld Granite Company send us a handsomely got up circular in book form, in regard to the Threlkeld stone, which is called a granite incorrectly (as they admit), but which has some of the qualities which characterise granite as an enduring road material. The testimonials of various engineers and others as to its behaviour as a road material seem very satisfactory.——Messrs. B. S. Brownlie & Co. send us their illustrated catalogue of sanitary ware in white and yellow enamelled fireclay.——Messrs. J. H. Wilson & Co. have issued a well-illustrated and fully-priced catalogue of their lifting machinery, dredgers, winding engines, &c.——From Mr. J. H. Sankey we have received a small-sized catalogue of varied descriptions of brick, stoneware, and tiles, including blue and buff stoneware, chemical stoneware apparatus, channels, traps, junctions, chimney-pots, and ornamental tiles.

Correspondence.

To the Editor of The Builder.

THE ORIENTATION OF TEMPLES.

Sir,—Your correspondent "Enquirer" in your issue of the 16th inst., has put some questions which may very naturally occur in the first opening of the above subject, but which can, as it appears to me, be very conclusively answered. As respects question 1—"Was the star needed at all?" You, Sir, have, I think, in your leading article of the previous week, given a sufficient answer to this question in showing the high probability that the Greeks in their temples of earliest foundation were but following in the steps of the Egyptians, in whose country the adytum of the temple must have been the point of observation where the light from a rising or setting star would be received "through the long avenues and vistas leading from light to gloom," much in the same way as Mr. Lockyer has pointed out that a ray of light is guided through the diaphragms of a modern telescope. In the Greek temples also, following Egyptian types, the adytum would have been the place of observation, and from this point stars rising or setting in the general direction of the axis of the temple could alone have been seen. We know from other sources (though it hardly needs argu-

ment) that before the invention of clocks the time at night was measured by the rising or setting of the heavenly bodies.

2. The condition which has been named, that archæological probability has to be observed in this study, is criticised by "Enquirer" as "arguing in a circle." Granted that it is so: but it is a circle of very unusual extent, being measured by 26,000 years, whilst all the examples are confined to a segment of less than 1,500. An Orientation in Greek architecture which should require a star coincidence outside the smaller limit would have to be looked at with great suspicion: but there are no cases known to me.

For solar temples, too, the choice is very much restricted. I do not find that there are more than eighteen stars or star-groups which could have been used in the entire zone of the heavens: even if the time limit introduced by archæological probability were dispensed with. One of the eighteen cases is that of ζ Aquarii to which, with one or two others, "Enquirer" objects on account of its want of brilliancy. This objection may be allowed to hold of this particular star, but the star does not stand alone: it is the representative and centre of a conspicuous and compact constellation. Besides, in this and every case of the stars of magnitudes below the first (not reckoning the Pleiades which are obviously exceptional) these stars are found to have been combined with the orientation in such a manner that a rather larger interval of time was allowed between the star waning and the sunrise than when stars of the first magnitude were employed.

3. The cellas of the temples have been in so many cases destroyed that the evidences of Western doorways have in most cases been obliterated. They existed, however, in the Parthenon, in the Temple of Jupiter Panhellenius at Ægina and at Corinth, and in no case where I have found that a setting star agrees with the orientation is there evidence of an unpierced Western wall, excepting the Temple of Niké-Apteros at Athens; but the existing temple was rebuilt after the Persian invasion, long after the star had ceased to answer its original purpose. The peculiarity of the site of Bassæ appears to have determined its north and south position; it certainly did so at Mycenæ and the Gabeiron, near Thebes.

5. Previous to the study of solar and stellar orientation it was certainly a very reasonable theory to advance that pictuesqueness of general effect led to so many groups of buildings in Greece being placed obliquely to one another; but whilst granting the happy result, we can hardly suppose that this consideration could have actuated the builders of the very modest shrines which were first founded and which determined the lines of the more sumptuous structures which were subsequently raised on the same sites, and in most instances having the same parallels.

F. C. PENROSE.

THE SANITARY INSTITUTE REPORT ON FLUSHING CISTERNS.

SIR,—As the correspondence in the *Builder* and elsewhere shows that considerable interest is taken in the experiments which the Sanitary Institute has recently carried out on the flushing of closets and drains, perhaps you will allow me to point out for the information of your readers that the work was undertaken by the Institute as a question of public interest, and in order to make the information as widely available as possible the report, with the tables and plans, has been published as an excerpt from the *Transactions*, and can be obtained separately.

G. WHITE-WALLIS, Secretary.

THE CAUSES OF BAD WORK.

SIR,—With reference to Mr. H. R. Taylor's letter in your last issue, I should imagine from his remarks that he is a supporter of trades-unionism and not an employer of labour, otherwise he would know that what he states in his second paragraph is contra to practical experience at all events. A good man on any work at full wages is known always to be the best man, and the cheapest, whether it be upon plain or intricate work, and a good man is always worth his money, and an inferior one—like everything which is cheap—is bad at any price, and in my experience it is the worst men, whether paid at a higher or lower rate, that are discharged first, when occasion requires shortening of hands, and a good man can always obtain employment anywhere at full wages.

As regards the quality of London work, I should like to show Mr. Taylor a letter which I have received only recently respecting some work which has been done in London by unionists, and if he did not alter his opinion I am afraid his mind is hardly open to conversion. I am also in possession of facts from which it is certain that, on a job now completing in London, where country-produced work and London-made work (in about equal proportions) has been used from the very beginning until this moment, during a period extending over several years, the former is very much indeed superior to the work done in London. Moreover, we people in the country generally find that London men who come into the country to work are inferior to country workmen, as regards their ability to do the best work, and I have only during this year had a man from London, who had there been in receipt of full unionist wages, come to me, and when he found the character of the work which was done in my establishment, asked to be permitted, at much lower wages than he has been receiving in London, and at a wage below the standard of the men employed by me, to work with me as improver, as he stated he had not had an opportunity in London of learning his trade, and seeing such good work as was done with me!

These are facts of my knowledge, and they are difficult to reconcile with the statements published in Mr. Taylor's letter.

A PROVINCIAL EMPLOYER OF UNIONIST LABOUR.

BATH PUMP-ROOM COMPETITION.

SIR,—While I cannot concede one iota of my original view, I can and do say that if a competition be invited on the clear understanding at the outset that the dictum of the "adviser" is *not* binding on either side, there can of course be no injury whatever done, each side knowing its exact position; but I still maintain that the "award" of an arbitrator (for such the "assessor" surely is, or should be), cannot be set aside without injustice and injury to the competing architects, nor indeed to the committee inviting them (unless the arbiter's opinion is on a par with that of the umpire in a cricket match who said, when appealed to for a decision, "If you'll believe me, gentlemen, I wasn't looking, but if he does it again he'll be out"), but arbiters are, methinks, usually selected from the ranks of men of evident ability and honour, and therefore their judgment as experts should surely be of more value than those of the general public (from whose ranks committees come), whose opinion seems bounded by the dictum "I know what I like." In a word, if he is merely an "adviser" he cannot be called an "assessor."

For some years I have kept clear of competitions, and only move now in the honest belief that what I advance is the only way to secure *fair play on both sides*, unless it is conceded without a struggle that our professional brethren are so unimportant that they must perforce accept, and that without question, any judgment meted out to them.

E. SWINFEN HARRIS, F.R.I.B.A.

*** We think our correspondent is mistaken in regard to the meaning of the word "assessor." We take it that an assessor is a person who sits by and advises as an expert.* If the architectural profession choose to agree not to go into any competitions unless the assessor makes the award absolutely and chooses the architect who is to carry out the building, they may get that, but on the other hand they may pull the cord too tight, and end in squeezing out the assessor altogether. And our correspondent, like some other persons, does not seem to see that there may be disadvantages in giving absolute power to the assessor. He may be a very eminent architect, but he is an individual, and has possibly strong predilections in favour of one style or one method of planning, and the result will be that he will choose the design which most accords with his own tastes, and that the man will win who knows his tastes and consults them. The case is very similar to that of judge and jury. The judge in a court of law is nearly always a much abler man, and knowing much more about law, than any one on the jury; but he is a single person and liable to the prejudices of a single person, and the jury are provided to obviate that danger. He advises and instructs the jury, and they find the verdict, and it is probable that the interests of justice are safer on that system than if the judge gave the verdict. Why should not the same reasoning apply to the case of assessor and committee?—ED.

KIRKCALDY HALLS COMPETITION.

SIR,—One would expect that in such competitions as this, instituted by an honourable corporation, the conditions would be honourable and fair to both the corporation and the profession, and that the competition would be carried on in accordance with the suggestions of the Royal Institute of British Architects. Evidently no competent party has been advising the corporation as to the conditions, for a circular with five conditions comes as a supplement to the first document, containing, like a lady's postcript, the most important matters. As a footnote to the supplement to the conditions the important instruction is given that the plans are to be on imperial drawing paper. Now, either the Kirkcaldy arithmetic is defective, or it is not known in that locality that the size of imperial is 30 in. by 22 in. The length of the site is 300 ft., and the scale is fixed at one-eighth of an inch to the foot, thus the paper is 7½ in. too small to hold the ground plan, even without a margin. It looks as if the Kirkcaldy folks had carried their ideas of economy a little too far this time. They want altogether too good a bargain. As, for instance, they appropriate the plans awarded the second and third premiums in order that they may adopt the good points without payment, thus not only stealing the author's ideas, but depriving them of their well-finished drawings. In asking specifications, they also exact more than they are fairly entitled to, but in reducing the architect's fee by 20 per cent. they have beaten the record. Jews are supposed not to be able to make a living in Aberdeen, but I think the Kirkcaldy folks could give even Aberdeen points. It is to be hoped that the corporation will recast their conditions in accordance with the Institutes' suggestions.

FAIR PLAY.

PRIME COST.

SIR,—A great difficulty by which architects are often beset is that of dealing with "Prime Cost" provisional sums. It is usual to define "prime cost" items somewhat as follows:—"All items marked as "P. C." mean prime cost value at works, and it is to be distinctly understood that any profit the contractor may desire, charge for packing, carriage, and fixing, are to be added to the amount named in each case."

If the amount specified is fully spent, then the contractor tries to force a further allowance from the manufacturer. Or if it is in the provinces, the architect goes to the ironmonger, for instance, chooses stoves up to the full amount specified, after having deducted the 15 or 20 per cent. discount, as the case may be. The contractor refuses to pay the ironmonger the full amount due.

Now, Sir, is this "prime cost" condition a mistake altogether? Is it the business of the contractor and not of the architect and his client?

If some of your readers who have carefully thought this matter out would give us the benefit thereof and also of their experience, I am sure it would be of great value to many young practitioners, and perhaps even to older ones. G. W. L.

*** We should say it is a matter for the contractor. The architect merely names the value as a rough definition of the class of goods he wants.—ED.

The Student's Column.

GEOLOGY.—XXVII.

GEOLOGICAL MAPS.

GEOLOGICAL maps relating to the United Kingdom are of two classes—those made (*a*) by private individuals, and (*b*) by the officers of the Government Geological Survey.

Of the former class we have but little to say. They have, for the most part, been drawn up to elucidate the structure of some new or little-known region, and are usually accompanied by some thesis published in the Journal, or "Transactions," of a learned society. Such maps, necessarily, are not published on any particular plan, and may be described as a heterogeneous assemblage of useful information dealing with special districts. We find a large number of maps, more or less authentic, referring to mining regions; to tracts of country proposed, or about to be absorbed in some scheme of water supply; to areas affected by certain diseases; and so forth. Then we have general geological maps of the British Isles, for the most part of a rather sketchy nature, and not of much value, except when compiled from the official sources about to be mentioned. Many of these productions of private individuals are of sterling worth, and frequently treat of subjects not adequately dealt with elsewhere; but the majority are comparatively worthless, having been in too many instances drawn up hurriedly, on very imperfect data, to urge the claims of some pet theory.

The work of the Government Geological Survey, however, is of a very different character. As might naturally be expected of an organisation of that kind, there is at any rate a method in everything done; the maps, except in certain cases presently to be referred to, have a distinct relation to one another, and the whole country has been systematically surveyed. In constructing their maps the Geological Surveyors have, with a few unimportant exceptions, used the topographical maps of the Ordnance Survey as a basis, these latter merely having the geological information added to them. The

* Since the above was written, we have referred to Webster's Dictionary, and find "assessor" defined generally as "one who sits beside; the assistant of a judge." It is more particularly defined as "one appointed or elected to assist a judge or magistrate with his special knowledge of the subject to be decided; as *legal* assessors, *nautical* assessors." This, it will be seen, entirely disposes of the idea that many architects seem to have, that the term "assessor" in itself implies the power of absolute decision: it rather implies the contrary. The "assessor" is in ordinary acceptation an adviser, not a judge.—ED.

original field surveys are done on the scale of 6 in. to one mile in those districts where maps of that scale are available; in other parts, maps on the 1-in. scale are used as a topographical basis. The official catalogue states that where the districts contain coal-bearing strata, or other mineral-bearing rocks of commercial importance requiring greater detailed information, the original survey upon the 6-in. scale has, in most instances, been engraved and published. In all cases the geology mapped in the field upon the 6-in. scale is reduced and published upon the 1-in. maps, which then constitute the general geological map of the United Kingdom; and on this scale the whole will be published as each individual sheet is completed.

In addition to the foregoing, a geological index map of Wales, with parts of the adjacent counties, on the scale of 1 in. to four miles, has been published for some years; and we are pleased to note that the same is now being done in regard to the whole of England, the first few index maps having been recently issued. We venture to think that the maps on this manageable scale will be found more useful for general reference than the larger scale maps alluded to, though they cannot, of course, compete with the latter where accurate detailed information is required.

The 1-in. maps of the Geological Survey are of two kinds; those dealing with (*a*) the general rock masses—called "Solid" maps; and (*b*) the superficial sands, gravels, &c.—known as "Drift" maps. Before proceeding to describe these we may profitably glance at the class of information conveyed by them, in common with other maps of the Survey; the student will then see in what way they assist the architect and engineer.

It has been laid down as a general principle that the prime object of the Survey is to construct accurate geological maps of the country; and no one will say that, on the whole, the Survey has been found wanting in that respect. At the same time, it must be confessed that the public was not wholly prepared to find that this prime object so absorbed the attention of the officials concerned that many other things which might be legitimately regarded as part of the Survey work, have, at best, received but scant consideration. What is an official geological map, as exemplified by specimens of English production? It is one on which the limits between divers geological formations are carefully drawn, and where distinctions are made between various other classes of rock. It shows by graphic methods the relation in the field between these groups; whether they are horizontal, vertical, inclined, or unconformable to each other; whether thrown into contortions, anticlines, or synclines, and whether faulted or not. It denotes sites where copper, tin, iron, lead, or other useful metal occurs, and gives the outcrop and general position of coal seams, where possible. But it must be remembered that the mapping applies only to what occurs at the surface of the ground, or to the outcrop of the "solid" rocks; for information concerning the structure below the surface, the student must consult the vertical and horizontal sections published by the Survey.

Now, on the face of it, it would seem that these maps are very useful; and so they are to the geologist who contents himself with the philosophical aspect of the science alone; but they are by no means as useful as they might be from the economic standpoint. From the coal-miners' point of view they are, no doubt, excellent; but the engineer is not catered for at all, except in a general way. We have said that the maps show the extent and positions of the outcrops of geological formations and rock masses. We may remind the student that the dividing line between one formation and another is determined not by the change in lithological character of the beds, but by the general facies of their included organic remains. From the purely scientific point of view we have nothing to say to this, which is the fundamental principle governing all stratigraphical geology. But we cannot shut our eyes to the fact that the boundary lines have very little significance from a practical aspect. The engineer wants to know at a glance whether this or that site is suitable for constructing a reservoir upon; whether soils in a given district are porous or impervious; if the ground will permit of an embankment or cutting being easily made; the sites of wells, &c. In other words, he wants a map constructed to show the variations in the character of the solid rocks, so that if a clay passes into a sand, and the latter into gravel, he may have an opportunity of easily ascertaining the fact. We abstain from commenting on the inestimable boon that would be conferred upon agriculture by such maps, especially were the chemical composition of the soils freely given. Maps of this kind are not impracticable, as witness the efforts of the Russian and Belgian geological surveys.

The maps on the 1-in. scale are published in sheets and quarter-sheets. The "solid" edition is, for the most part, done on the old series of the Ordnance Survey, so that whilst they leave but little to be desired from a geological point of view, the topography is frequently very incorrect. The working geologist usually transfers the boundary lines from the old maps to the new, but anyone who has essayed in that direction knows the difficulties of the case. The "solid" edition marks the distribution of rocks beneath superficial deposits, where such exist; the "drift" shows the occurrence of all superficial deposits, as well as the solid rocks where these latter actually crop out. The "drift" edition, which, however, is far from being completed, is much to be preferred as giving more precise information, whilst the topography is more up to date.

A word or two may be said in regard to the scale of our English maps. For working purposes in the field the 1-in. map is too small; all who have practically used the larger scale (from. 2·53 to 3·16 in.) geological maps on the Continent will endorse this observation. On the other hand, except for very detailed work, the 6-in. scale is too large. We should not forget, however, that ours is the pioneer Geological Survey of the world, and that others have naturally profited by our experience.

CONCLUSION.

In conclusion, we may remark that geology has played a much more conspicuous *rôle* in architectural matters than most architects are aware of. Prior to the advent of railways, the character and style of buildings were largely dependent on the local distribution of building material. As Simonin says*—"Si Gênes est une ville de marbre, elle le doit aux montagnes voisines de Carrare. Paris est bâti de pierres de taille et de moellons qu'il emprunte à ses carrières, tandis que Londres, qui repose sur l'argile, n'est qu'une ville de briques."

No one will deny that the magnificent Elizabethan structures so commonly found in areas where Jurassic rocks abound, to a large extent owe their presence on the spots where they exist, to the close proximity of good freestone. No one sees such structures, except as a rarity, far away from stone districts. The reason why churches in areas where chalk crops out have been so frequently built of flint is not far to seek; neither is there much difficulty, in face of the abundance of red sandstone in the vicinity, in understanding why such a city—say, as Chester—is so largely constructed of red stone; nor why granite, to the exclusion of almost all other stone, is used in Aberdeen, imparting such a special character to its edifices as to earn for it the title of the "granite city."

But if this is so in regard to mansion-houses and large towns. how much more strikingly apparent does it become in rural districts, where the nature of the ground is imprinted on every hamlet.

OBITUARY.

MR. W. F. WOODINGTON, A.R.A.—On the 24th inst. the death took place of Mr. William Frederick Woodington, A.R.A., in the eighty-eighth year of his age, at his residence, 51, Hayter-road, Brixton-hill, S.W. Mr. Woodington contributed to the Westminster Hall competition for sculpture a model of "Milton and his Daughters." He also executed one of the large reliefs, "The Battle of the Nile," for the pedestal of the Nelson Monument, and subsequently the bas-reliefs for the chapel containing the Wellington Monument in St. Paul's. Among his portrait statues and busts are the six statues of Captain Cook, Sir Francis Drake, Sir Walter Raleigh, Columbus, Galileo, and Mercator, for the New Exchange, Liverpool, executed under the direction of Mr. T. H. Wyatt, the architect. The large marble bust of Sir Joseph Paxton at the Crystal Palace, which measures 8 ft. 6 in. high, is by him, as also a bust of Mr. M'Dowell, one of the series of portrait busts belonging to the Royal Academy. Mr. Woodington was, besides, a painter, and studied in the life-school of the Royal Academy. Among his pictures exhibited at the Academy were "The Angels directing the Shepherds to Bethlehem" (1853), and "Job and his Friends" (1855).

MR. WILLIAM WATKISS LLOYD.—On the 22nd inst. the death took place of Mr. William Watkiss Lloyd, who died after a short illness, in London. According to the *Times* he was born in 1813, and received his early education at the Grammar School, Newcastle. In the thirties, when antiquarians were rarer than they are at present, Mr. Lloyd was an acknowledged expert. The result of his wide culture, even at so early an age, first appeared in print in 1845 in an essay upon the Zanthian Marbles, dedicated to Sir Charles Fellows. An interval of nine years followed, during which time he wrote much and published little, if anything. "The Dramatic Works of William Shakespeare, with notes by J. W. Singer, together with the life of the poet and critical essays on the plays by W. W. Lloyd," appeared in 1845. In 1854 Mr. Lloyd was elected to the membership of the Dilettanti Society. He wrote many treatises upon both the architecture and sculpture of the Periclean time, chiefly in journals. In 1865 Messrs. Williams & Norgate published "Christianity in the Cartoons of Raphael referred to Artistic Treatment and Historic Fact." The year 1866 produced "Raphael in the Vatican," an essay upon philosophy, theology, and poetry in the age and the art of Raphael. "The History of Sicily to the Athenian War, with elucidations of the Sicilian Odes of Pindar," was published by Mr. Murray in 1872. "The Age of Pericles" (Macmillan) followed in 1875. The British Museum is to receive into its keeping the entire collection of Mr. Lloyd's published as well as his unpublished manuscripts. Among the latter are a "Further History of Greece," "The Century of Michelangelo," besides invaluable materials and the results of research concerning architecture, sculpture, and painting. His last printed work is upon the central groups of the eastern frieze of the Parthenon. Mr. Lloyd was a corresponding member of the Archæological Societies of Rome and Palermo. At one time he was a very frequent contributor to the *Builder*. In later years he only contributed occasionally, but it may interest our readers to know that he was the writer of several articles which have appeared in our columns from time to time during the last few years on the subject of the optical proportions of Greek temples, based on a very careful consideration of minutiæ of measurement. Some of these were signed by his name, but some other unsigned articles of a similar nature are also by him.

MR. WILLIAM JOHN METTAM. — At the last moment we hear with regret of the death of Mr. Mettam, architect, of Leeds, Associate of the Institute of Architects, and who at the time of his death was President of the Leeds and Yorkshire Architectural Society. Mr. Mettam died from pneumonia following on influenza. His loss is regretted by a large circle of friends in Leeds. As a member of the profession he was active in doing all in his power to uphold a high standard of professional honour.

GENERAL BUILDING NEWS.

RESTORATION OF ST. PETER'S CHURCH, MARKET-BOSWORTH.—St. Peter's Church, Market-Bosworth, has just been re-opened after restoration. An organ has been erected, and the seats of the church have been widened. The work has included the erection of a reredos, the placing of a screen dividing the chancel from the remaining portion of the church, the adornment of the chancel, the erection of a new pulpit, and general repairs to the exterior of the church fabric. The reredos is of oak. The pulpit and screen are also of oak. The upper portion of the pulpit is divided into four niches, with cusped and canopied heads, the spaces between being diapered. The niches between contain statuettes representing Moses, Elijah, St. John the Baptist, and St. Peter, the Patron Saint of the Church. The chancel screen is an arcade of five bays with tracery and carved and moulded cornice and cresting, the centre portion being raised above the rest, and is finished with a cross flanked by two angels bearing scrolls. Other work on the church includes the clearing off the plaster from the chancel walls, and re-pointing throughout, reinstating the stone-work, excavating for and forming chamber under the organ, fitting up the chancel with wrought-iron gas-pendants, and the provision of a carved Litany desk. On the exterior, all the fabric walls and tower have been repointed, and a drainage and gutter of concrete have been placed round the foundation of the church. The work throughout has been executed from the designs and under the superintendence of Mr. Chas. E. Deacon, architect, of Liverpool, by the following:—Carved work in reredos, organ, screen, pulpit, &c., and the stone statutes, by Messrs. Harry Hems & Sons, of Exeter. The organ, by Mr. Porritt, of Leicester. The general restoration of the walls, &c., by Mr. Beck, of Market Bosworth. The gas pendants were supplied by Messrs. Singer & Sons, of Frome. The marble and mosaic work by Messrs. Swift, of Liverpool, and the white silk altar frontal by Messrs. Thos. Brown & Son, of Manchester.

TRUANT SCHOOL, LICHFIELD.—The Midland Truant School at Lichfield, situated on Beacon Hill, is to be opened next week. The school has been erected to receive 100 truant boys, with school rooms, dormitories, and every requisite accommodation. In connexion is a house for a resident superintendent and matron, and provision for three masters and servants to live on the premises. The architect is Mr. R. Stevenson, of Burton-on-Trent, whose plans were placed first in an open competition. The contract for the building amounted

* "Les Pierres," 1869, p. 244.

to 11,605*l.*, and the buildings have been upwards of a year in course of construction. The contractors were Messrs. Thomas Lowe & Sons, of Burton-on-Trent. The clerk of works has been Mr. Joseph Rice, of Burton-on-Trent. The building is in the Renaissance style. The principal portions of the premises are three stories high, and the roofs are covered with Penrhyn blue slates and red-ridged tiles. The building stands about 70 ft. from the road, is 142 ft. 6 in. by 145 ft. 9 in. in area, and is to have a front boundary wall of Derbyshire grit-stone. The building is approached by a large entrance hall, with dining hall on one side and school-room and class-room on the other, and immediately opposite is a board-room or superintendent's office. Within easy distance are dressing-rooms, lavatories, and swimming-bath for the boys. Three rows of sprays are erected, each row accommodating sixteen boys. The swimming-bath is 19 ft. by 10 ft. in measurement, and rises from 3 ft. 6 in. to 4 ft. in depth. This is heated by a low pressure circulating boiler. Beyond is situated a tailors' shop, 25 ft. by 20 ft. Near the tailors' shop is the receiving department, fitted up with bath, fumigating and disinfecting oven, and clothes store, where the old clothing is stowed away. On the first floor are three dormitories, two 50 ft. by 20 ft. each and one 25 ft. by 18 ft., and four rooms for masters. The masters' rooms are all supplied with inspection windows. On the second floor an infirmary is constructed, and it comprises day and sick wards and nurse's room. Connected with the institution is a laundry, 26 ft. 3 in. by 16 ft., which is fitted with Bradford's patent clothes-horses and heating chamber, and supplemented with other modern appliances. On the south side of the building are constructed kitchen, scullery, stores, servants' hall, servery, needle room, &c. To the front of the building on the same side, at the corner nearest to Lichfield, the superintendent's house is situated. Adjoining the lower rooms of the house is the officers' mess room, fitted with an inspection window. Under the domestic offices are placed a boiler for heating the buildings and a steam boiler for the cooking apparatus in the kitchen. At the back of the school is an asphalted drill-yard about 100 ft. square, with a covered drill-shed 48 ft. by 18 ft. at the end. In connexion with the schools an isolated hospital for infectious diseases has been erected on the north side of the ground. It provides for four beds, and consists of sick and day wards, bath-room and lavatory, nurse's room, kitchen, store, &c. The whole of the school buildings are heated by hot water on the low-pressure system, while in the dining-hall and school-rooms open fire-grates are provided. The hall and dormitories are supplied with radiators, and the foul air in the main blocks is extracted by means of Boyle's ventilators connected to trunks in the roofs. The entrance-hall, dining-hall, school and class-rooms, and kitchen and scullery have dados of white glazed bricks. The contractors for the various fittings have been as follows:—Heating and cooking apparatus, Messrs. Newton, Chambers, & Co., Sheffield; jet lavatories and sanitary appliances, Messrs. B. Finch & Co., London; laundry requirements, Messrs. Thomas Bradford & Co., Manchester; locks, &c., Messrs. J. M. Harlow & Co., Burton-on-Trent; and furniture, Mr. A. R. Dean, Birmingham.

CONSTITUTIONAL CLUB, HARLESDEN.—The new quarters of the Harlesden Constitutional Club, situated in St. Mary's-road, were opened on the 18th inst. by Earl Cadogan. The new building contains a concert-hall, capable of seating 500 persons. A fixed stage has been erected in the hall, together with dressing-rooms. To the left of the entrance is a reading-room; while the upper rooms are set apart for the various social needs of the members, and for the use of the officials. Billiard-rooms have also been provided. The total cost of the buildings and fittings is 4,000*l.*, Mr. Shaw being the architect.

INFANTS' SCHOOL, LLANDAFF.—The Bishop of Llandaff recently opened the new infants' school erected in contiguity to the Llandaff National Boys' and Girls' Schools. The new school is a stone building, and was erected by Mr. J. W. Roger, contractor, after designs prepared by Mr. Halliday, architect.

CLUB BUILDINGS, WOLVERHAMPTON.—A working men's club is being erected in North-road, Wolverhampton. Messrs. C. Manton & Sons, of Chapelash, Wolverhampton, are the architects. Messrs. Jones & Attwood, engineers, of Stourbridge, will supply the heating apparatus, and Messrs. Butler Brothers, of Wolverhampton, are the contractors.

BUILDING WORK IN ABERDEEN.—Although the various industries in Aberdeen have, as a rule, experienced depression during the past year, the building trade has met with busy times. A great many tenemented dwelling-houses have been erected, chiefly in the western and north-western suburbs, and also in what is practically the new town, on the south side of the river Dee. Among the more prominent public buildings at present going on are the following:—New police buildings, Lodge Walk; hospital at Royal Lunatic Asylum; administrative block, Royal Infirmary; electric lighting station, Cotton-street; extension of City Hospital, Park-road and Urquhart-road; Salvation Army citadel, Castle-street; new Baptist Church, Gilcomston Park; new Holburn Free Church, Great Western-road; additions to Nazareth House Industrial School and House of Refuge, Claremont-street; newspaper office, Broad-street; extension of Marischal College; additions at the Blind Asylum, Huntley-street; ditto at Deaf and Dumb Institution, Belmont-street; and the extensive additions at the Trinity Hall, the property of the Seven Incorporated Trades. The following is the best classification that can be made of the plans of new buildings sanctioned by the Town Council during the year from January to December inclusive:—Blocks of shops and dwelling-houses combined, 15; dwelling-houses alone, 166; cottages, 7; workshops, factories, and warehouses (including several rebuildings after fires, &c.), 30; alterations and additions on premises of various descriptions, 57; churches, public halls, schools, &c., 14; and miscellaneous, 28. What are described as "dwelling-houses" will accommodate on an average six families. As a family averages five, provision would thus be made for upwards of 5,000 persons. The population of the city, however, increases at the rate of about 2,000 only per annum; and as the Burgh Assessor in April reported as vacant houses for 993 families, it is evident that, although 170 tenements were closed by the public health authorities as uninhabitable, new house-building is being overdone, and a lull is likely to ensue in that department after the removal term in May next. In the monumental and ornamental granite works trade has been flatter during the year; and, chiefly owing to financial disorganisation and other causes in America, from which a large demand used to come, granite merchants had to pay off a considerable number of hands, while numbers of workmen who had emigrated to the United States had to return to Aberdeen as poor as they went, work having fallen off on the other side of the Atlantic. A good many men otherwise out of work were employed by the Town Council in connection with the new gasholder, but their task is now about completed, and unskilled labourers generally find difficulty in getting work. The Tramways Company intend to double the line in the George-street section where the width of the street admits, and to extend their Holburn-street line to Old Bridge of Dee, and have deposited a private Bill in Parliament for the requisite authority. The 35,000*l.* scheme for new promenade, electric tramway, and new pavillion in connection with the sea-bathing station has collapsed, and a much smaller affair—pavilion, &c., to cost about 3,000*l.*—is now proposed.

PROPOSED CHURCH, BARTON, PRESTON.—At a recent meeting of the building committee of the proposed new Church of St. Saviour, Barton, it was finally decided that Mr. R. Knill Freeman, of Bolton, and Surveyor of Ecclesiastical Dilapidations for the Diocese of Manchester, should be appointed architect for the building, and efforts are being made to push matters forward with a view to commencing building operations as soon as possible in the year 1894. The new church is estimated to cost about 5,000*l.*, and is being erected to take the place of the old one. The seating accommodation provided will be for 420 persons.

RESTORATION OF SHIPLEY CHURCH, SUSSEX.—The Parish Church of St. Mary, at Shipley, has just been re-opened after restoration. The restoration has been carried out from the designs of Mr. J. L. Pearson, R.A., the contractors being Messrs. Cornish & Gaymer, of North Walsingham. The whole of the stonework has been overhauled and repaired, the north aisle pulled down and rebuilt; a new vestry has been added on the north side; and the whole of the outside walls stripped of the rough cast, and the stonework repointed. Much plaster has also been removed from the interior, and the Norman work and corbels of the tower arches have been revealed. The church now possesses an oaken roof; and the seating throughout is also in oak, with Gothic carving on the ends. A carved oak pulpit and a brass lectern have been presented.

SANITARY AND ENGINEERING NEWS.

PURIFICATION OF THE MERSEY AND IRWELL RIVERS.—The Stockport Corporation have commenced to enter into contracts for carrying out the works of the extensive scheme for intercepting sewers to divert and treat the whole of the sewage of the borough, to prevent the same polluting the river. The main sewer of the works is 7 ft. diameter, to be laid at from 15 ft. to 60 ft. below the surface of the ground. The sewers will skirt the rivers along the valleys of the Mersey and Tame within the borough, except a portion of the outfall, which will be on the left bank of the Mersey. The works of the outfall will consist of eight large reservoirs, into which the sewage will be pumped from the main sewer, about 17 ft. in height, and afterwards passed through some seventy-five acres of land, which will act as a filter, on which the effluent sewage from the tanks will be applied intermittently before it is allowed to flow into the river. The whole of the structural works are estimated to cost 95,000*l.*, exclusive of land purchase. Mr. A. M. Fowler, M.Inst.C.E., of Manchester, is the engineer for the works, and Messrs. T. & W. Meadows, Stockport, have provisionally obtained the contract for the first section of the sewer at the sum of 33,500*l.*

SEWAGE DISPOSAL, BIRKDALE, LANCASHIRE.—On the 20th inst., at the Birkdale Town Hall, Major-General C. Phipps Carey held an inquiry on behalf of the Local Government Board into the application of the Birkdale Local Board to borrow 11,000*l.* for the purpose of surface drainage and sewage disposal. The original scheme propounded by the Local Board was to deal with the sewage by precipitation in tanks by the "international" process, and to turn the effluent on the seashore south of the Palace Hotel near low-water mark. This was opposed by the property-owners in the locality and by the Southport Corporation, and to meet this opposition it was agreed that land should be obtained for the treatment of the effluent, and that then it should flow into Fine Jane's Brook as before. Eight acres of land were secured, but this being found unsuitable the site was changed and eleven acres of higher ground substituted. The surface water would be discharged by a separate system on the foreshore. The total cost of this work was put down at 21,000*l.*, and in May last the Local Government Board had granted the Board permission to borrow 10,000*l.*, leaving the 11,000*l.* now applied for.

FOREIGN AND COLONIAL.

FRANCE.—Mr. Hunt, the well-known American architect, has been elected a foreign corresponding member of the Académie des Beaux-Arts, in place of M. Matyko, who has died abroad.——M. Mercié has been definitely selected as the sculptor for the monument to be erected to Gounod, in the Park Monceau. M. Formigé has been commissioned to undertake the architectural portion of the work, which will be commenced immediately.——M. Jules Chéret has submitted to the committee for the decoration of the Hôtel de Ville an interesting sketch for his design to be executed in one of the rooms. The two principal compositions symbolise the Comedy of Molière, and the principal personages in Pantomime.——M. Cavelier, the sculptor, who is eighty years of age, has received dangerous injuries from a fall.——The Municipal Council of Paris have just inaugurated a lying-in hospital in the Rue de Tolbiac. This new establishment, which is to be called the Asile Michelet, has been built after the plans of M. Bouvard.——M. Georges Berger, Deputy for the Seine district, is shortly to address an "interpellation" to the Chamber of Deputies relative to the construction of the proposed Gare des Invalides, which has occasioned so many protests among architects. M. Berger proposes, in order to avoid destroying the harmony of the Esplanade des Invalides, to form the new station either in the old Imperial stables of the Quai d'Orsay, or on the site of the tobacco manufactory not far from there. If this latter project were accepted, the headquarters of the State railway lines would also be established on the same site.——Mdme. d'Ennery has presented to the State a splendid collection of objects of Chinese and Japanese art, consisting of about 5,000 pieces.——An International Exhibition of Paper-making and Paper Industries is to be held next year at the Palais de l'Industrie, from July 23 to November 23. Applications for space will be received up to March 31.——At the École des Beaux-Arts judgment has been given on the competition called "Des Architectes Americans." The first prize has been awarded to Mr. Bigot.——Important works for the construction of new abattoirs on the left bank of the Siene are to be undertaken at the commencement of the new year. The cost of the work is estimated at 6,336,000 francs.——The Louvre Museum has received a fine picture by the elder Breughel, known by the title of "La Chaîne des Aveugles." It was purchased by the Direction des Musées Nationaux, at a public sale at Antwerp.——The Municipality of Saint Saulve, near Valenciennes, has commenced the erection of a monument to the memory of Mdme. Duchesnoy, the celebrated actress, who was born in that village, in 1777.——The Sèvres Museum has received two vases in "terre noire" found in the neighbourhood of Haragha, the legendary birthplace of Zoroaster. These appear to be very rare specimens of Persian work of the fifth century B.C.——The death is announced, at the age of sixty-eight, of M. Léon Boussod, for a long time one of the chiefs of the "Maison Goupil," now directed by his son and son-in-law, MM. Boussod and Valodon. He was intimately connected with the artistic movement of the last forty years. In regard to painters he was a far-seeing commercial agent, and with no æsthetic prejudices of any kind.

GERMANY.—The Vereinigung-Berliner-Architekten has decided to arrange a "Congress" of church architects for Easter next, to decide on questions of plan suitable for the modern requirements of the Lutheran service. A number of well-known ecclesiastics will be invited to attend the Congress, and there will be an exhibition of the designs of churches erected in Germany during the last decade.——The systematic reconstruction of the old wooden bridges over the Spree has been continued at Berlin this year as in 1892. The two bridges to be taken in hand next are the historical "Weidendammersbrücke" and the "Oberbaumbrücke," the former of which crosses the river in the line of the Frederick-Strasse—*i.e.*, the Berlin "Oxford-street." Of the bridges crossing the canals, the most important one to be rebuilt next is

COMPETITIONS, CONTRACTS, AND PUBLIC APPOINTMENTS.

COMPETITIONS.

Nature of Work.	By whom Advertised.	Premiums.	Designs to be delivered.
*Drainage Works, &c.	Woking Local Board	50*l.*, 25*l.*, 10*l.*, and Four of 5*l.* each	Jan. 15'94
*Public Hall, Library, &c.	Kirkcaldy T.C.	50*l.* 30*l.* 20*l.*	Mar. 17
*Branch Public Library	Hull Corporation		No date

CONTRACTS.

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
*Collecting, &c. Dust and Ashes	Acton Local Board	*Official*	Jan. 2'94
Kerbing and Paving, Palmer-street	Sale Local Board	A. G. M'Beath	Jan. 3
Extension of Cemetery	Colchester Burial Bd.	C. E. Butcher	do.
Extension of Business Premises, High-street, Bangor		R. Davies	do.
Road Works, Materials, &c.	Belford (Northumberland) R.S.A.	A. J. Ware	Jan. 4
Re-making Queen's Grove-road, Parkstone	Poole Town Council	J. Elford	do.
Infectious Diseases Hospital, East Pilton	Leith Town Council	Mr. Simpson	do.
Sewering, Forming, &c. Footways	Urmston (Lancs.) Bur. Board	H. S. Batey	Jan. 5
Road Materials	Bognor Town Council	Chas. Adcock	Jan. 6
*Works and Materials	St. George's, Hanover square	G. Livingstone	do.
Cast-iron Pipes (800 tons)	Newbury Town Coun.	J. Anstie	Jan. 8
Reservoir (100,000 galls.) &c.	Leamington Corp.	Mr. de Normanville	do.
Pipe Laying (seven miles)	Kilmarnock (N.B.)Corp	J. Wilson	do.
*Supplying and Laying Paving	Leyton Local Board	W. Dawson	Jan. 9
Four Cottages, Evershot Station, Dorset	G. W. R. Co.	*Official*	do.
*Yorkshire Stone	Greenwich Bd. of Wks.	do.	Jan. 10
Rectory Buildings, Mablethorpe, Lincs.	Rev. D. R. Whitelaw		do.
*Casual Wards	Poplar Union	W. A. Hills & Son	do.
Paving, Kerbing, Channelling, &c. Rhondda and other Roads	Pontypridd Local Bd.	Edwd. Rees	Jan. 11

CONTRACTS—*Continued.*

Nature of Work or Materials.	By whom Required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.
Cast-iron Pipes, Irregulars, &c.	Rochester, Chatham and Stroud Gas Co.	W. Syms	Jan. 1
Sunday School Buildings, Hall, &c. Swindon, Wilts	Rev. J. E. Leuty		Jan. 12
Parish Rooms, Barnstaple		W. C. Oliver	Jan. 13
Sinking Well, &c. Chichester	West Sussex County Lunatic Asylum	*Official*	Jan. 15
*Materials and Plant	LondonCountyCouncil	do.	do.
*Refreshment House, Highgate	do.	do.	Jan. 16
*Slaughterhouses, &c.	Southport Corp.	do.	do.
*Sinking Well	Mansfield Corp.	G. Hodson	do.
*Five Houses, &c. for Coast Guards, Felixstowe	Admiralty	*Official*	Jan. 19
*Asylum at Whitecroft, near Newport	Isle of Wight County Council	B. S. Jacobs	Jan. 22
*Gas Engineering and Fittings	West Ham Sch. Bd.	Newman & Jacques	do.
*School Buildings and Residence	Steventon Sch. Bd.	J. Gibson	Jan. 24
*Boundary Walls, &c.	Carisbrooke Burial Bd.	W. C. Way	Jan. 29
*Sewerage Works	Keynsham R.S.A.	C. N. Lailey	Feb. 6
Alterations to Premises, Birley-street, Blackpool		R. Gorst & Son	No data
Residence, Crossmead, St. Thomas, Devon	J. Langdon Thomas	Jas. Crocker	do.
Twelve Dwelling-houses, Henrietta-street	Ashton-under-Lyne Town Council	J. Eaton & Sons	do.

PUBLIC APPOINTMENTS.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in.
*Surveyor	St. Mary Stoke Newington Vestry	300*l.*	Jan. 6
*Surveyor	Beckenham Loc. Bd.	350*l.*	Jan. 9
*Mill Foreman	LondonCountyCouncil	3*l.*	Jan. 10

Those marked with an Asterisk (*) are advertised in this number. Competitions, p. iv. *Contracts, pp.* iv., vi., *and* viii. *Public Appointments, pp.* xx. *and* xxi.

the Potsdamer bridge, which is also situated on a main artery.——The Kroll Bier Gardens and Assembly Hall, which for many years have been the scene of some of the finest classical operas, will not be further used as an opera house, but only for the purposes it was originally intended for.——Cologne is to have a new synagogue at the cost of about 15,000*l.* A competition has been opened for the design. Three premiums of 135*l.*, 85*l.*, and 50*l.* will be given, and four months allowed for the preparation of the drawings.——At Strasburg a technical middle-class school is to be founded, with four independent departments. The first division is to be for building construction; the second for technology generally; the third for road and dyke building, and the fourth for land surveying.

SWEDEN.—A large new municipal school has been completed in Stockholm, the cost being 434,000 Kr.——The new "villa town," Djursholm, a suburb of Stockholm, is rapidly being covered with modern residences in English style, sixty having already been completed. A large number have been built by architects and artists, who appear to particularly favour the new suburb, one of the most striking structures being that of Herr Fr. Lilljekvist, a prominent architect. The quarter will shortly be in communication with the city by an electric tramway.——A statue of Nils Ericsson, once Lord Protector of Sweden, was unveiled recently by King Oscar. This makes the twelth statue in the open squares of the Swedish capital.——The leading organ, the *Börstidning*, in an article on the "Riches of Sweden," calls upon builders and architects to use more extensively native stones, as, for instance, granite, porphyry, and gneiss, in their operations in preference to foreign materials.——The brick and tile industry of Sweden is year by year growing in extent. The clay for the manufacture is only found in the province of Scania, along with the anthracite coal deposits there; this province being the southernmost in the country.

NORWAY.—The erection of the new national theatre in Christiania is progressing very slowly indeed. At the present rate of progress several years must elapse before the building can be finished. As yet only the pile-driving and part of the excavations for the foundations have been carried out.——Funds are being collected by "Norwegian artists" for the erection of an art exhibition building—*i.e.*, a kind of *Salon*, in Christiania. Recently the fund has been enriched with a legacy of 80,000 Kr., so that the building may now be soon commenced.——In the competition for the building of a new municipal church at Oslo, the first and original part of Christiania, the first premium, 1,500 Kr., has been awarded to Herr H. S. Larsen and Herr H. Jürgensen, architects, for the best design. these two gentlemen having collaborated. The second premium, 1,000 Kr., was divided between two other competitors; there were twelve in all. Two important municipal churches have of late been completed in Christiania—viz., those of Paulus and Sagene. The former, constructed by the Crown architect, Herr H. Bull, was commenced in 1889. It is built in the form of a cross, with chapel adjoining the principal aisle. The exterior is entirely faced with red tiles from the factory at Porsgrund. The roof and spire are covered with grey Norwegian slates, whilst all detached columns externally are cut from grey Idefjord granite, with bases and capitals of sandstone from Throndhjem. The cost of the edifice is 200,000 Kr. The style is of course Gothic. The Sagene church is situated in the northern and poorer part of the city, and is a less imposing structure than the former. Eleven designs wete sent in under the public competition, and the first premium and the commission awarded to Herr Chr. Fürst, architect, of Christiania. Here, too, the style is Gothic, and this edifice is also built in the shape of a cross, with one large and four smaller spires. The church was commenced in 1888. In the construction, the same materials as in the Paulus church have been employed, and the cost has also been the same—viz., 200,000 Kr.——A novel structure has been added to the sights of Christiania in the shape of a great square "tower," erected on the premises of the Telephone Company. The frame-work is of iron, and the height 40 ft. It is capable of receiving 8,000 cables. It has been designed by Herr Bull, the Crown architect.——In connexion with the new Custom-house, now in course of erection in Christiania, the harbour board has appointed a commission to deal with the question of constructing a serics of new quays along the sea-shore.——The great gable group which is to ornament the front of the Christiania University is now being cast in bronze, the sculptor being Herr Skeibrok, a rising young artist.——A new museum in the Gothic style has been completed in the town of Stavanger. The architect is Herr Eckhoff, and the cost has been 90,000 Kr.——The Bricklayers' Union of Christiania has held a mass meeting, protesting against the introduction of Swedish labour whilst Norwegian bricklayers are starving, and calling upon builders only to employ the latter.——A house of business in Christiania has been faced externally with Norwegian marble in various colours, the effect being very striking. Some of the stone resembles dark-red sandstone. This is the first use of native marble on a large scale.

MISCELLANEOUS.

THE UNIVERSAL TWENTY-FOUR HOURS' MOVEMENT.—The progress of the movement for "universal time" all the world over has been exceedingly slow; but it has advanced another step. Since November 1 the time used on the Italian railways (and probably, therefore, throughout the country) is that of a meridian exactly one hour east of Greenwich. Since May 1 the standard time in Germany depends upon the meridian one honr fast of Greenwich. A Bill is before the Austrian Parliament to make the standard time in Austria the same as that in Germany and Italy. In Sweden the time in use is almost the same. Belgium and Holland have adopted the English, that is the Greenwich time. In Australia the Postal Conference has passed a resolution that it would be advisable to use one time—namely, nine hours fast on Greenwich. In the United States and Canada the territories are divided into hourly zones, in each of which the time in use is respectively four, five, six, seven, or eight hours slow on Greenwich time. Italy has also arranged to use the twenty-four hours' system of time notation. It is now twenty-six years since watches and clocks had their dials made to carry out this in Britain and France, yet it has never been adopted.—*Pall Mall Gazette.*

NEW ORGAN, WELSH PRESBYTERIAN CHURCH, LIVERPOOL.—The Welsh Presbyterian church, Prince's-road, Liverpool, which was built some twenty-five years ago from the designs of Messrs. W. & G. Audsley, is now being additionally ornamented by having an organ fixed, which will be shortly completed. The organ is placed behind and continuing at the sides of the pulpit, and is formed in two projecting bays, the centre portion recessed in a curved sweep, and is constructed on a gallery supported by ornamental columns and brackets. The front of the gallery is designed to correspond with the existing gallery fronts, The side bays have the pipes arranged to form gables and towers, relieved with pitch-pine casing, and pinnacles with turrets, and carved gilded capitals, while over the centre portion or canopy the pipes are arranged in triplet gables, with the casing in oak, and ornamented with pinnacles and carved capitals. The whole is designed so as not to obstruct the large tracery window behind. The hydraulic engines, with bellows, are placed in the vestry at the rear; the former is worked by water supplied from the Liverpool mains. The specification of the organ was prepared by Mr. W. A. Roberts, organist to St. Paul's Church, Liverpool. The organ builders are Messrs. Norman Bros. & Beard, Norwich; the gallery and case is being executed by Messrs. Brown & Backhouse, contractors, Liverpool, from the designs and specification prepared by and under the supervision of Mr. T. G. Williams, architect, of Liverpool. The hydraulic engines are supplied by Messrs. Melvin & Sons, Glasgow. The total cost will be about 1,600*l.*

HUBBARD'S BRICK COMPANY, LOWESTOFT.—We understand that this company (which was floated by George Fitt & Co., of Norwich, two years since), at its annnal meeting a few days ago, declared a dividend of 10 per cent., after allowing 10 per cent. for depreciation and carrying forward a sum equal to 11½ per cent. on the share capital of the company. This shows the total net earnings of the company to be 31½ per cent., a very satisfactory result, after taking into consideration the great advance in coal, and a considerable sum spent in preliminary expenses and permanent improvements.

ROYAL SOCIETY OF PAINTER-ETCHERS.—The President and Council of the Royal Society of Painter-Etchers have decided to hold their next exhibition from March 12 to April 7, 1894. A selection of the engraved work of Marc Antonio will be a feature of the exhibition. It has been further decided to hold the election of Associates on Friday, January 5, 1894, at 5 p.m.

ANNUAL DINNER, SOUTH SHIELDS MASTER BUILDERS.—On the 20th inst., the annual dinner of

the South Shields Master Builders' Association was held in the County Hotel, Westoe. Mr. D. Lawes, President of the Association, occupied the chair. After the loyal and patriotic toasts, Mr. Tyrie, Newcastle, proposed "The South Shields Master Builders' Association." There was a feeling that builders were in the habit of manufacturing extras. He denied that they did so. In the building trade, as in other trades, he admitted there were black sheep, but they had not more of them than others. Architects, he held, were often responsible for many of the faults that were laid at the builders' door. The Newcastle Association had laid it down as a distinct condition that the architect should not be sole arbiter between the client by whom he was paid and the builder. They intended to insist that an independent person should act as arbitrator. They should also insist that quantities should be prepared by a proper quantity surveyor. Builders were hemmed in by restrictions on the part of labour, and he did not see why they should not assert what they felt to be their rights. Mr. J. S. Wilson replied. He quite endorsed the sentiments that had been expressed by Mr. Tyrie. Referring to the work of the South Shields Association, he said the first year had been a very prosperous one. They had added to their numbers, and were endeavouring to secure a better feeling between masters and men.

ELECTRIC LIGHTING AT HARROGATE.—The electric lighting scheme adopted for the borough of Harrogate has been projected by Mr. George Wilkinson, M.I.E.E., consulting engineer. It is intended, first, to produce and supply the electric light at a cheap enough rate so as to compete with the gas supply; and secondly, to deal in an effectual way with the refuse collected from the ashpits of the borough. The results of experiments made by Mr. Wilkinson on an extensive scale are said to demonstrate the fact that what is known as "town's refuse," when put through a process of sorting, sifting, and drying, has a well-defined value as a fuel for generating steam power. On the other hand, the method hitherto adopted in many towns, of placing the crude, wet, and unsorted material into immense brick-kilns or furnaces, where it roasts for a time and smoulders, has been found quite unsuited for steam-power generation. The method resorted to by Mr. Wilkinson is as follows:—The refuse is brought in carts or otherwise, and tipped upon a platform, whence it is automatically carried into a rough-sifting apparatus, which separates the old pots, cans, &c., the smaller material passing through the sifter and into a large hopper, from which it is forced in regular quantities into a drying cylinder, which extracts nearly one third of its weight in the form of moisture. It then passes on to another sifter, which takes out the fine dust, the resultant fuel being passed down a shoot, and automatically injected into the special boiler furnaces. The dust forms a manure.

RECREATION GROUND, FULHAM. — A new recreation-ground for the inhabitants of Fulham was opened on the 22nd inst. by Mr. John Hutton, the Chairman of the London County Council. The meadow, which has been acquired at a cost of 19,000*l.*, is situated on the north bank of the Thames at Putney, just in front of the Palace of the Bishop of London, and a short distance west of Putney Bridge. A new river wall has been erected, and the ground has been levelled and laid out with flower beds, trees, and shrubs, and the paths paved with asphalte.

INDUSTRIAL EXHIBITION, STRATFORD.—On the 23rd inst. Mr. Archibald Grove, M.P., opened an industrial exhibition at the Town Hall, Stratford, in aid of the West Ham Hospital. The exhibition comprises a large number of works of art, paintings, and drawings, models of engines, machinery, ships, and houses, and a variety of useful articles of interest as having been made by working men in their spare moments. Mr. J. Holden, superintendent of the Great Eastern Works, lent a collection of locomotive and railway appliances, and a number of local manufacturers also sent exhibits, while the centre of the hall was taken up by stalls filled with the outcome of the handiwork of scholars at different schools in West Ham.

LEGAL.

BUILDING ACT CASE:

EXEMPTIONS.

MR. H. J. BUSHBY delivered judgment at the Worship Street Police Court on the 21st instant in a case which had been argued before him on a previous occasion.

A summons was taken out against Messrs. Kirk & Randall, contractors, by Mr. Henry Lovegrove, District Surveyor of South Islington and Shoreditch, in each of the followiug cases:—A building had been erected at the cost of the London and North-Western Railway Company in Maria-street, Shoreditch, for the purposes of storing fodder for Messrs. Allsopp & Co., and the contractors were instructed by the railway company not to give notice and not to pay the fees. The building was completed while the parties were discussing the matter, and the summons was therefore for fees instead of neglect to give notice. Another building to be used by Messrs. Cameron & Co., coal merchants, had been erected under similar conditions.

Mr. Lankester, barrister, appeared on behalf of the company, and Mr. Lovegrove conducted his own case.

The magistrate having cited the various cases gave judgment for the District Surveyor, with costs in each case.

A case will be stated for the decision of the Queen's Bench Divisional Court.

MEETINGS.

WEDNESDAY, JANUARY 3.

Builders' Foremen and Clerks of Works' Institution.—Ordinary Meeting. 8.30 p.m.

Institution of Civil Engineers of Ireland (Dublin).—Meeting to be held at 35, Dawson-street. 8 p.m.

FRIDAY, JANUARY 5.

Architectural Association.—Mr. A. O. Collard on "Difficulties of the Young Architect" 7.30 p.m.

Junior Engineering Society.—Professor Vivian B. Lewes on "Boiler Incrustations and Deposits." 8 p.m.

RECENT PATENTS:

ABSTRACTS OF SPECIFICATIONS.

22,275.—SLIDING WINDOWS: *W. Youlten.*—This invention relates to an arrangement of parts in sliding windows, which, while allowing the same means of sliding as generally in use, provide for the reversing of the sashes for cleaning or similar purposes. There are many mechanical details incorporated in the invention to this end.

1,067.—TOP OR GUARD OF CHIMNEY-SHAFT: *J. D. Newell and others.*—According to this invention the top is circular on plan, and preferably closed, and ports or openings for the escape of the smoke (or air currents in the case of ventilators), are made in the side. An outside guard is made of sufficient size to cover half the openings at a time. This guard is carried outside the top by an arm which is pivoted on the top and extended to a vane which also serves as a counterpoise to the guard. As this guard is vertical and concentric with the chimney-top, and the pivot of the arm is coincident with the axis of the top, any wind current will hold the guard between it and the openings in the top on that side it blows against.

1,746.—HINGES: *C. Showell.*—This patent relates to an improvement in the method of manufacture, chiefly in the process of casting the hinges, but pieces called chills are also introduced into the hinges to make them more durable.

6,173.—WINDOW-SASHES: *J. Nicoll.*—This invention has for its object the construction of windows so that they can be easily opened inwards, and the windows readily cleaned from the inside. The stiles of the sash are divided into two parts. One the sliding part, which is capable of moving up and down, and the other part pointed to the top and bottom rails. The frame is hinged at one side, and on the other side it is locked, the inside frame opening laterally.

12,373.—CHIMNEYS:—*O. Foerster* (Berlin).—Chimney shafts or stacks are, according to this invention, provided with apertures on their foursides, such apertures being inclined upwardly at an angle of about 30 deg. to the chimney-flue, and each aperture being of a sectional area, about equal to the clear area of the corresponding flue.

14,760.—SOIL-PIPES AND VENTILATING SHAFTS: *W. J. & E. Freeman.*—By these improved connexions soil-pipes may be caulked with lead, brass, or gun-metal thimbles or casings. One pipe is made with a socket and the other with a flange, both thoroughly tinned inside, and a lead tee-piece cast on them when cool, so that the casings are firmly attached to the lead. Other details for simplifying the connexions of the "out-go" pipes with the vertical soil-pipe are incorporated with the invention.

17,620.—WINDOW-FASTENER AND SILENCER: *A. J. & H. G. Clark*—A wedge and thumbscrew fastener which draws the sashes together, preventing rattling.

NEW APPLICATIONS FOR LETTERS PATENT.

DECEMBER 11.—23,786, P. Mooney, Pedestal and other Brackets for the Support of Water-closet Seats.—23,815, C. Jackson, Sash-fasteners.—23,818, E. Wutke, Roofing Tile.

DECEMBER 12.—23,898, H. Lake, Sash-fasteners.—23,923, F. Bostel, Flushing Cisterns.

DECEMBER 13.—23,946, D. Dean, Regulating and Automatic Outlet Ventilator.—23,954, W. Graham and J. Breare, Draught-excluders.—23,977, A. Giesan, Chimney Pot.—23,991, W. Monro, Spigot for Earthenware Fittings, Drain Pipes, &c.—24,025, G. Webb and others, Manufacture of White Lead.

DECEMBER 14.—24,052, W. Sharp and W. Cruickshanks, Syphons for Water-closet Cisterns, &c.—24,061, E. Kent and H. Beeson, Painting Brushes.—24,088, G. Eastwood, Window Sash-fastener.—24,097, S. Barry, Opening, Closing, and Fastening Window Sashes.

DECEMBER 15.—24,112, R. Yates, Construction of Breakwaters, Sea-walls, Piers, Quays, &c.—24,120, F. Speed, Branch Connexion Pipes for Water-closets.—24,121, A. Wilson, Construction of Buildings.

DECEMBER 16.—24,201, C. Brindley, Preventing Water-pipes Bursting by Frost.—24,214, D. Murrow and A. Taylor, Varnishes, Paints, Enamels, &c.—24,236, W. Peyton, Stove or Firegrate.—24,246, J. Collingwood, Constructing the Floors and Superstructures of Wood Buildings.—24,251, C. Roberts and E. Beckett, Testing Roofs and Pillars in Mines.—24,256, J. Gascoigne, Fire-proof Door or Shutter.—24,267, O. Banks, Metallic Lathing, Netting or Webbing.—24,280, W. Griffith, Water-closet Seats.

PROVISIONAL SPECIFICATIONS ACCEPTED.

21,106, M. Adams, Sanitary Flushing Apparatus.—21,872, F. Maclean and R. Kay, Hinging Sliding Sash Windows to Open Inwards.—21,894, R. Hammond and W. Pownall, The "Universal" Gully.—22,083, G. Wallis, Pug or Mortar Mills.—22,418, D. Buchan, Deodorising and Disinfecting Water-closets, &c.—22,630, W. and J. Hulme, Connecting Pipes.—22,668, J. Toft, Street Gullys, &c.—22,688, A. Waterhouse, Flushing Tanks.—22,730, A. Buecher, Rust-preventive Paints.—22,740, A. Bridgman and D. House, Saw Benches and Sawing Machines.—22,747, M. Albert Van der Perk, Automatic Flushing Apparatus.—22,778, W. Bodin, Flushing Apparatus.—22,790, W. Osment, Hanging of Sliding Window-sashes.—22,961, F. Crane, Paints or Driers.—22,978, T. Potter, Fire-resisting Floors.—23,012, J. Stephenson and A. Dornan, Sliding Windows.—23,038, R. Robinson and R. Buck, Brick-cutting Tables.—23,097, J. Wallace and N. McCreedy, Saws.—23,111, H. Lake, Setting Saws.—23,209, W. Allen, Chimney Cowls.—23,317, W. Bartholomew, of the firm of B. Finch & Co., Water-closets.—23,446, A. and R. Knox, Mechanism for Adjusting the Table of Circular Saw Frames.

COMPLETE SPECIFICATIONS ACCEPTED.

(Open to Opposition for Two Months.)

3,116, J. Walton, White Lead.—16,560, G. & A. Marchant, Fastening for Windows and other purposes to prevent Windows from being opened from outside, and to prevent shaking of same when closed.—21,328, A. Boult, Fastenings for Doors, Shutters, &c.—21,549, C. Brentano, Kilns or Furnaces for Burning Cement.

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

DECEMBER 14.—By *Fuller, Moon, & Fuller* (at Croydon): 8, Adelaide-street, Croydon, f., 205*l.*; 14, 16, 18, Adelaide-st., f., 435*l.*

DECEMBER 18.—By *Norman & Bowen:* 3, 4, Springfield Villas, Teddington, l., 310*l.*—By *Mullett, Booker, & Co.:* F.g.r. of 36*l.*, Darley-rd., Wandsworth Common, reversion in 86 yrs., 770*l.*; the 150 part of a King's share in "New River Company," 590*l.*

DECEMBER 19.—*Walford & Wilshin:* Nos. 165, 167, Anerley-rd., u.t. 86 yrs., g.r. 24*l.*, r. 125*l.*, 1,310*l.*—By *Rutley, Son, & Vine:* 16, Munster-sq., Regent's-pk., u.t. 29 yrs., g.r. 7*l.* 10s., r. 54*l.*, 375*l.*; 10, Charlotte-st., Portland-pl., u.t. 13 yrs., g.r. 20*l.*, 265*l.*—By *E. Simpson:* 49 to 55 (odd), Parkstone-rd., Peckham, u.t. 71 yrs., g.r. 21*l.*, r. 107*l.* 18s., 565*l.*—By *Graves & Son:* 39, Aldridge-rd. Villas, Bayswater, u.t. 63 yrs., g.r. 10*l.*, r. 70*l.*, 550*l.*—By *C. P. Whiteley:* 10, Whiteley-rd., Gipsy Hill, u.t. 73 yrs., g.r. 6*l.*, 210*l.*; 10, 12, Osberton-rd., Lee, u.t. 70*l.*, g.r. 16*l.*, r. 80*l.*, 550*l.*; 5, Osberton-rd., u.t. 70 yrs., g.r. 8*l.*, 255*l.*; 19, Mathan Grove, Dulwich, u.t. 83 yrs., g.r. 6*l.* 10s., r. 28*l.*, 225*l.*

DECEMBER 20.—By *Smith, Son, & Cooper:* No. 139, King's Cross-rd., u.t. 43 yrs., g.r. 50*l.*, r. 80*l.*, 325*l.*—By *Reynolds & Eason:* Three villa residences, Lewisham, and 3 to 6, and 10 to 13, Beaufort Gardens, u.t. 63 yrs., g.r. 11*l.* 12s., r. 503*l.* 10s., 4,870*l.*; 242, 246, Brick-lane, Bethnal Green, u.t. 28 yrs., g.r. 12*l.*, r. 54*l.* 12s., 220*l.*; 1 to 3, Prince's-ct., u.t. 28 yrs., g.r. 18*l.*, r. 93*l.* 12s., 200*l.*; 4, 5, 6, Prince's-ct., u.t. 14 yrs., g.r. 30*l.*, r. 93*l.* 12s., 100*l.*

DECEMBER 21.—By *Fraser & Heigh:* 13, 15, Lulot-st., Highgate, u.t. 86 yrs., g.r. 10*l.*, r. 53*l.* 8s., 270*l.*; 23, 25, Retcar-st., u.t. 86 yrs., g.r. 10*l.*, r. 64*l.* 7s., 280*l.*

[*Contractions used in these Lists.*—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; e.r. for estimated rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; st. for street.; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; yd. for yard, &c.]

PRICES CURRENT OF MATERIALS.

TIMBER.

Greenheart, B.G.	ton	9/0/0 0/0/0
Teak, E.I.	load	5/10/0 15/10/0
Sequoia, U.S.ft.cu		2/3 2/6
Ash, Canada	load	2/10/0 3/15/0
Birch, do.		2/10/0 3 10 0
Elm, do.		3/5/0 4/10/0
Fir, Dantsic, &c.		1/5/0 2/10/0
Oak, do.		2/15 0 5/0/0
Canada		5/10/0 7/0/0
Pine, Canada red		2/15/0 3 5/0
Do. Yellow		2/5/0 4/10/0
Lath, Dantsic, fath		4/10/0 5/10/0
St. Petersburg		5/0/0 6/10,0
Wainscot, Riga, &c., log		2/5/0 4/10 0
Odessa, crown		2/5/0 4 10/0
Deals, Finland 2nd & 1st std	100	8/0/0 10/10/0
Do. 4th & 3rd		7 10,0 8 0/0
Do. Riga		7/10/0 9/0/0
St. Petersburg, 1st yellow		10'0/0 13/10/0
Do. 2nd yellow		8/0/0 9/0/0
Do. white		8/10/0 11/0/0
Swedish		8/0/0 16,0,0
White Sea		8/0/0 16/10/0
Canada, Pine 1st		22/10/0 29/10/0
Do. do. 2nd		17/0/0 18/10/0
Do. do. 3rd, &c.		7/10/0 10/10/0
Do. Spruce, 1st		9/0/0 11/0/0
Do. do. 3rd & 2nd		6/10/0 7/15/0
New Brunswick		6/0/0 7/5/0
Battens, all kinds		3/0/0 15/0/0
Flooring boards, sq., 1 in. prep. 1st		0/10/6 0 15/0
Do. 2nd		0/7,6 0/13/0
Other qualities—		0 5/3 0/7 0
Cedar, Cuba	ft.	/4 /4½
Honduras, &c.		/3½ /4½
Mahogany, Cuba		/3½ /6
St. Domingo, cargo av.		/3 1/6
Mexican do. do.		/3½ /4
Tobasco do. do.		/3½ /6
Honduras do.		/4 /5½
Box, Turkey	ton	4/0/0 13/0/0
Rose, Rio		8 0/0 20/0/0
Bahia		7/0/0 18/0/0
Satin, St. Domingo		0 0/6 0/1'3

TIMBER (*continued*).

Satin, Porto Rico		0/0/7 0/1/6
Walnut, Italian		0/0/3½ 0/0/7

METALS.

Iron—Pig, in Scotland	ton	2/3/9½ 0/0/0
Bar, Welsh, in London		5/17/6 6/0/0
Do. do. at works in Wales		5/7/6 5/10/0
Do. Staffordshire, in London		6/0/0 6/10/0
COPPER—British cake and ingot		46/0/0 46/10/0
Best selected		46/10/0 47/0/0
Sheets, strong		54/0/0 0/0/0
Chili. bars		43/2/6 43/7/6
YELLOW METAL	lb	0/0/4½ 0/0/5
LEAD—Pig, Spanish	ton	9/11/3 9/12/6
English com. brands		9/12/6 9/15/0
Sheet, English, 6 lbs. per sq. ft. and upwards		11/5/0 0/0/0
Pipe		11/15/0 0/0/0
ZINC—English sheet	ton	20/10/0 0/0/0
Vieille Montagne		21/0/0 0/0/0
TIN—Straits		75/0/0 75/10/0
Australian		75/5/0 75/15/0
English Ingots		79/10/0 80/0/0
Banca		79/10/0 80/0/0
Billiton		76/10/0 77/0/0

OILS.

Linseed	ton	20/0/0 20/5/0
Cocoanut, Cochin		34/0/0 0/0/0
Do. Ceylon		26/0/0 0/0/0
Palm, Lagos		25 10/0 0/0/0
Rapeseed, English pale		23'0/0 23/5/0
Do. brown		21/5/0 21/10/0
Cottonseed refined		20/10/0 22/5/0
Oleine		22/0/0 24/0/0
Lubricating, U.S.		4/0/0 5/0/0
Do. refined		5/0/0 12/0/0
TAR—Stockholm	barrel	0/18/6 0/0/0
Archangel		0/12/6 0/0/0

TENDERS.

[Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays.*]

BOURNEMOUTH.—For laying an 18-in sewer through Meyrick Park, also for the formation of new roads and sewers on the building estate adjoining Meyrick Park. Mr. F. W. Lacey, Borough Engineer and Surveyor:—

B. Cooke & Co.	£2,284	0	0	G. Troke	£1,850 0 0
F. Hoare & Sons	2,146	0	0	F. Reeks*	1,848 9 5
W. H. Saunders & Co.	1,951	15	9	*Accepted. [Surveyor's estimate, £1,800.]	

BOURNEMOUTH.—For the construction of a new central drive through Meyrick Park, and other works in connexion therewith. Mr. F. W. Lacey, Borough Engineer and Surveyor:—

B. Cooke & Co.	£2,150	0	0	F. Reeks (accepted)	£1,858 19 4
G. T. Budden	2,000	0	0	C. Stickland (informal)	1,459 10 0
W. H. Saunders & Co.	1,919	9	6	[Surveyor's estimate, £2,000.]	

DEVONPORT.—For the construction of 8,000 lineal yards of sewers, &c., for the Town Council. Mr. John F. Brown, Borough Surveyor, Municipal Offices, Devonport. Quantities by Surveyor :—

G. Shillabeer	£22,884 0 0	Pethick Bros.	£21,353 0 0
Lapthon & Co.	22,491 5 9	C. L. Duke	19,002 8 9
J. Shaddock	22,126 11 4		

EARLS BARTON.—For the erection of boot and shoe factory and offices for Messrs. White. Messrs. Mosley & Anderson, architects, Goodyear Chambers, Northampton. Quantities by the architects :—

J. Garrett	£637 10	C. W. Abbott	£495 10
J. B. Clarke	630 0	T. Piggott	479 0
H. Dorman	607 0	S. Knight	469 20
J. Sharman	572 0	Tebbutt & Pratt	469 10
W. Branson & Son	550 0	F. Johnson & Son, Earls Barton (accepted subject to alterations)	466 10
T. & C. Berrill	532 0		
W. Berrill	508 0		

[Architects' estimate, £515.]

KING'S LYNN.—For the construction of sewers, Church-street and Priory-lane, for the Corporation. Mr. E. J. Silcock, C.E., Borough Surveyor, King's Lynn :—

H. Collison, King's Lynn*	£632 14	S. Hipwell	£590 0

* Accepted.

[Engineer's estimate, £600.]

LEEDS.—Accepted for the erection of seven stables, making drain, &c. Mr. C. H. Thornton, architect, Commercial-buildings, Park-row, Leeds :—

Joseph Pullan, Beeston Hill £171 10 0

LLANDUDNO (N. Wales).—For the construction of a boat jetty, for the Improvement Commissioners. Mr. E. P. Stephenson, Engineer, Commissioners' Offices, Llandudno :—

Ed. Thorpe & Son	£568 0 0	R. L. Roberts, Llandudno (accepted)	£527 0 0
Jno. Weston	550 2 1		

LONDON.—For the reconstruction of the drainage and sanitary arrangements at the Hopton Almhouses, Holland-street, Blackfriars, S.E., for the trustees. Mr. Arthur W. Tribe, surveyor, 91, Clapham-road, S.W. :—

Galpin	£220	J. Moyle	£178
Hoare & Son	198	Whitehead & Co., Clapham (accepted)	162
Baguley	195		

NORTHAMPTON.—For the erection of shoe factory and offices, for Messrs. C. & E. Lewis. Messrs. Mosley & Anderson, architects and surveyors. Goodyear Chambers, Northampton. Quantities by the architects :—

F. Johnson & Son	£2,942 10	J. W. Walls	£2,600 0
G. F. Sharman	2,900 0	J. Garrett	2,596 0
Green Bros.	2,870 0	J. B. Clarke	2,500 0
A. P. Hawtin	2,860 0	W. Gregory & Son, Northampton*	2,497 0
H. Martin	2,800 0		
W. Heap	2,796 0		

* Accepted.

[Architects' estimate, £2,650 0 0.]

NORTHAMPTON. — For extension of factory, for Messrs. Marlow & Sons, shoe manufacturers. Messrs. Mosley & Anderson, architects, Goodyear Chambers, Northampton :—

H. Martin	£282	E. Archer	£249
J. T. Wingrove	264	A. P. Hawtin	230
J. Dunckley	260	J. Garrett, Northampton*	219
Green Bros.	254		

* Accepted.

[Architects' estimate, £240 0 0.]

ROTHERHAM.—For the erection of vestry offices, Moorgate-street, for the overseers. Mr. Edward Hutchinson, surveyor, 18, Howard-street, Rotherham. Quantities by architect :—

Geo. Pugh	£1,420	Chas. Green	1,244
Robt. Snell	1,399	A. T. Ripley	1,180
Chadwick & Co.	1,393	Messrs. W. Thornton & Sons, Glasshouse-st., Rotherham*	1,175
G. H. Smith	1,310		
W. Bell	1,279		
Richd. Snell	1,247		

*Accepted.

[Architect's estimate, £1,250.]

SHADFORTH (Durham).—For the construction of sewers and sewage purification works at Ludworth Colliery, in the Township of Shadforth, for the Durham Rural Sanitary Authority. Mr. Geo. Gregson, Surveyor, Western Hill, Durham. Quantities by the Surveyor :—

John Carrick £352 0 0
Thomas Manners, Durham (accepted) 334 0 0

[Surveyor's estimate, £331 18 2.]

SHEFFIELD.—Accepted for the construction of iron escape staircases, &c., at the workhouse, Fir Vale, for the Union Guardians. Mr. W. H. Ward, architect, Paradise-street, Birmingham :—

Moorwood & Sons, Sheffield £3,157 1 3

SHEFFIELD.—Accepted for additions, &c., to school buildings at the workhouse, Fir Vale, for the Union Guardians. Mr. W. H. Ward, architect, Paradise-street, Birmingham :—

George Carr, Sheffield £2,895

STOCKPORT.—For the construction of an intercepting sewer, &c., alongside the river Mersey, for the Corporation. Mr. A. M. Fowler, C.E., 1, St. Peter's-square, Manchester. Quantities by Messrs. Hurrell & Taylor, Manchester :—

Leak & Co.	£65,662 5 0	Prescott	£40,557 0 0
D. Shanks	49,684 3 3	Kirk, Knight, & Co.	39,970 0 0
Lee & Thomas	47,653 6 7	D. Eadie	39,175 0 0
G. Bell	44,933 13 8	Kellett	38,388 0 0
S. & E. Bentley	43,718 0 0	T. & W. Meadows	33,500 0 0

WHITBY.—For converting Wesleyan Mission Chapel, Flower gate, into public offices for the Local Board. Mr. Thomas Keat Scott, architect, 3, Albion-terrace, Whitby :—

John White	£735 0 0	Wm. Langdale, & Son Baxtergate, Whitby	£415 0 0*
Charles Winterburn	450 0 0		
Robinson Harland	448 10 0		

* Accepted.

WINDSOR.—For widening and improving St. Leonard's-road and St. Mark's-place road, for the Town Council. Mr. Thos. J. Davison, Borough Surveyor, Windsor :—

Adams	£366 7 3	Lee	£295 8 0
G. Pither	340 0 0	A. Reavell	274 0 0
Free & Son	319 0 0	T. Kelly, Windsor*	244 0 0
E. Knapp	297 0 0		

* Accepted.

WOLVERHAMPTON.—Accepted for the execution of sewerage works, New Bridge District (contract No. 8), for the Corporation. Mr. R. E. W. Berrington, Borough Engineer, Town Hall, Wolverhampton :—

H. Holloway, Wolverhampton £4,349 0 0

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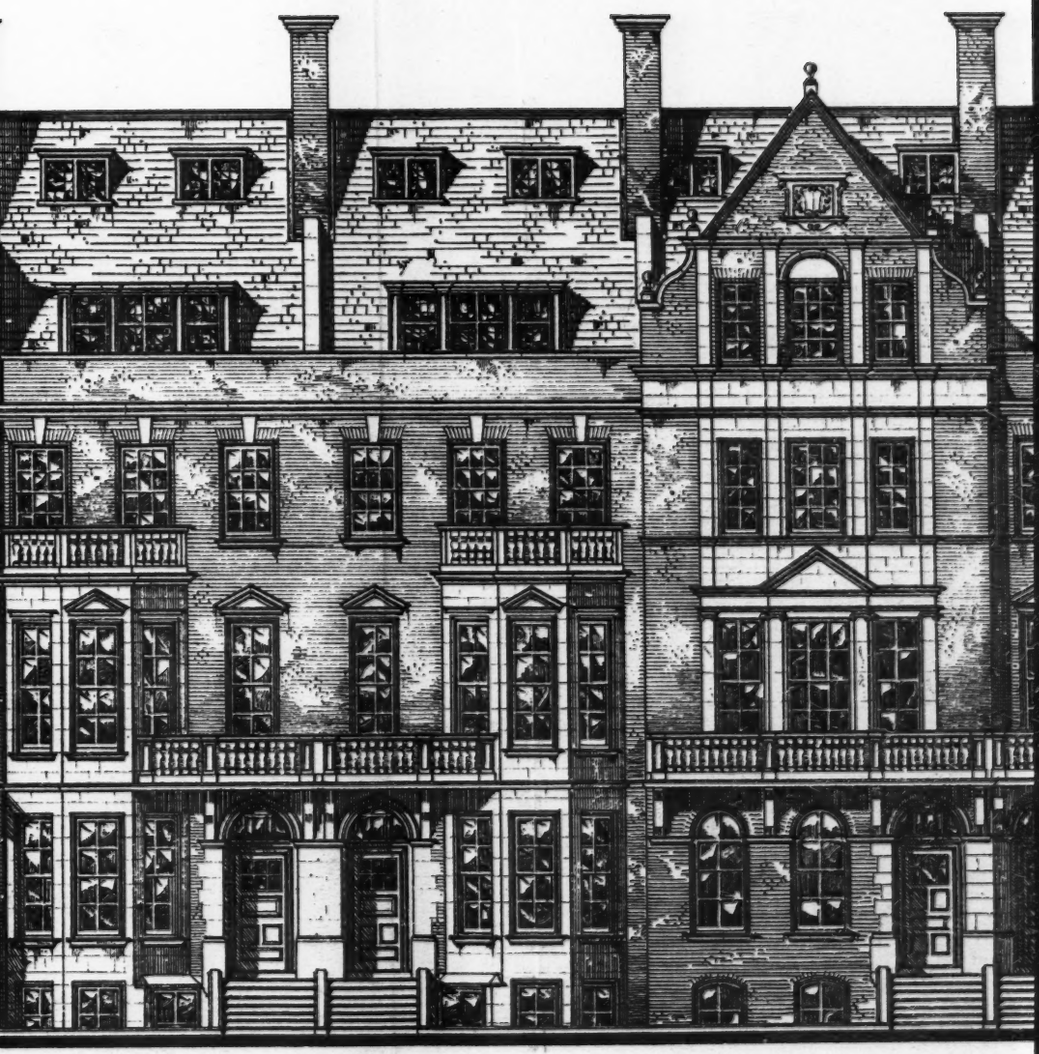
Royal Academy Exhibition, 1893



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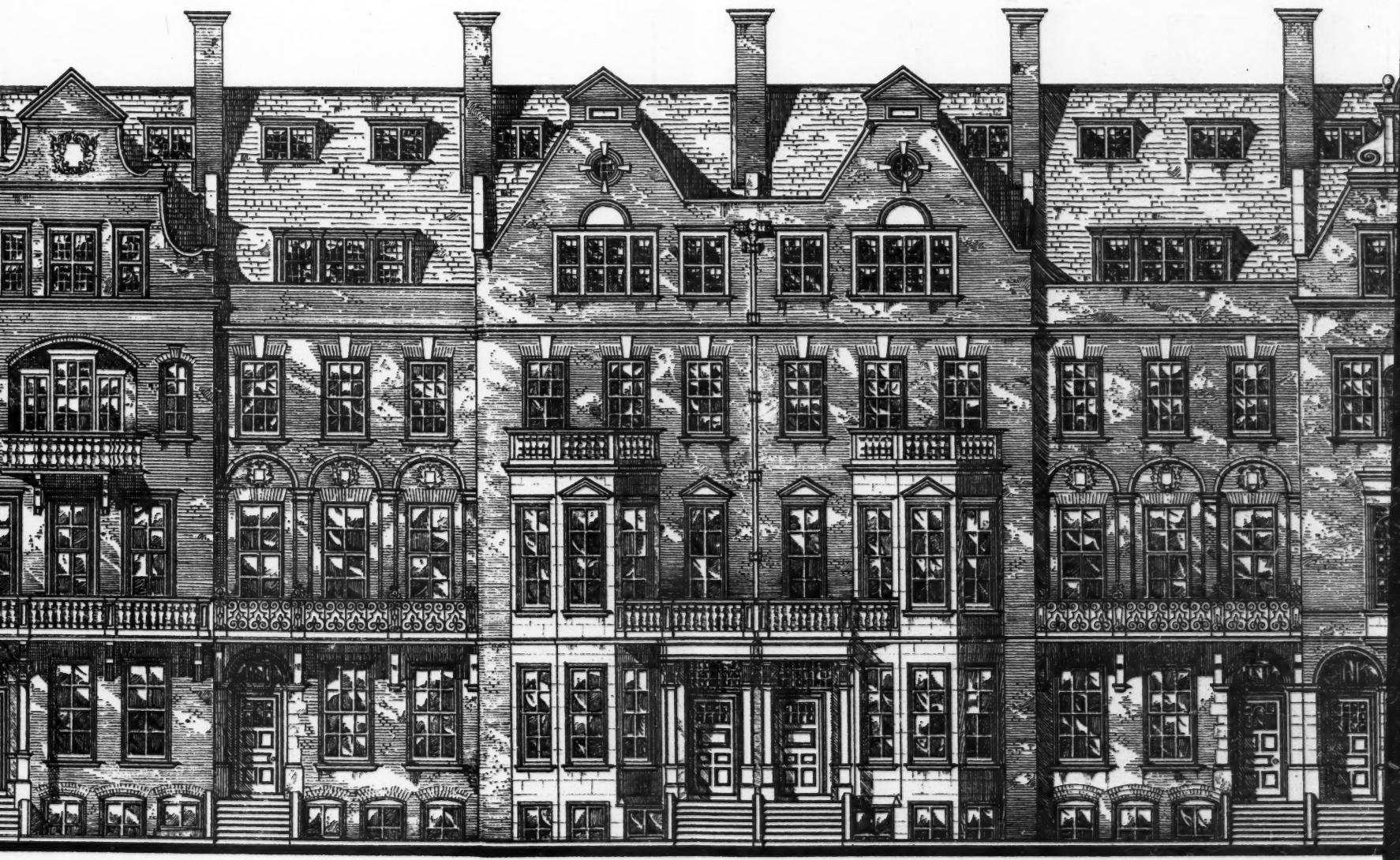

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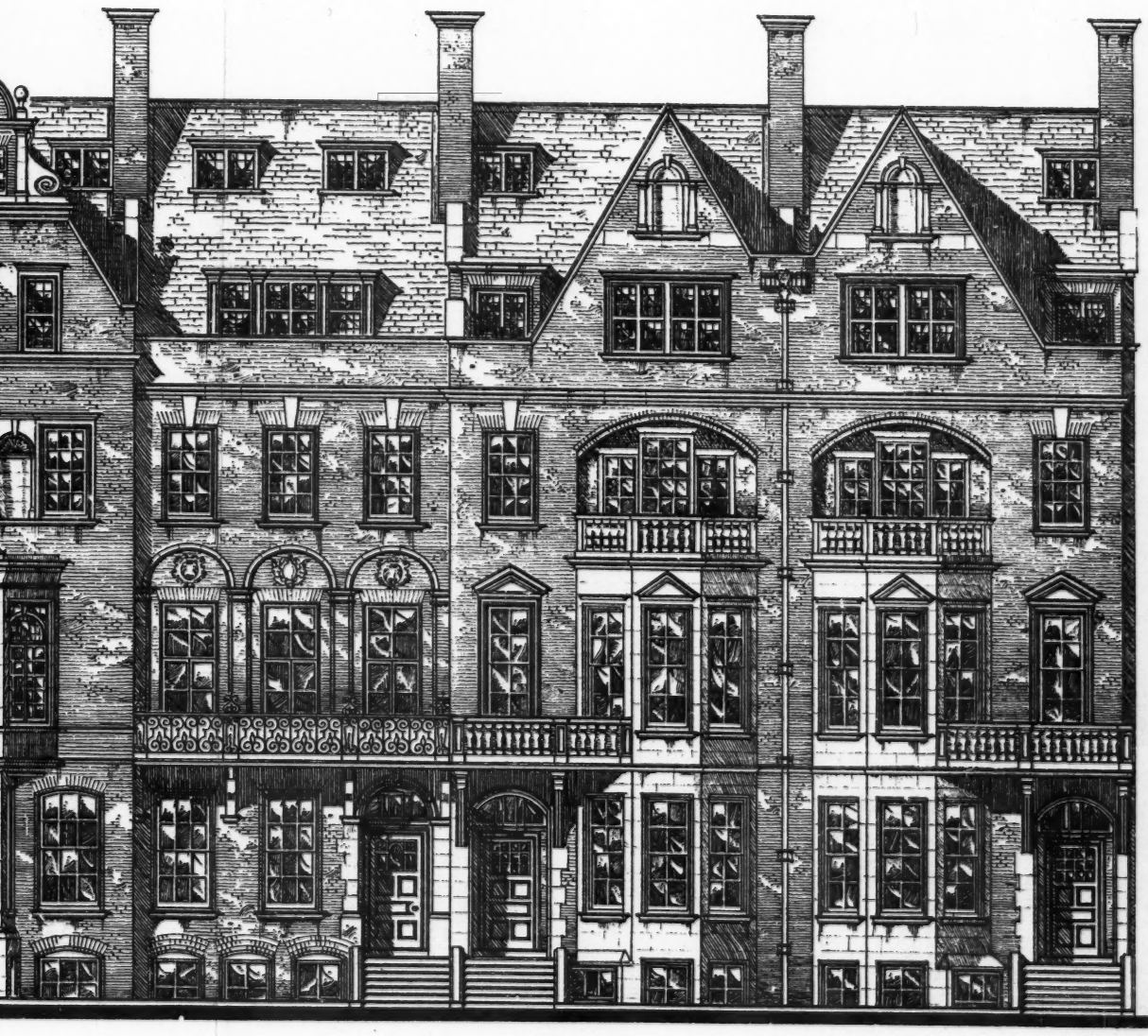

J. Stevenson
Arch.t

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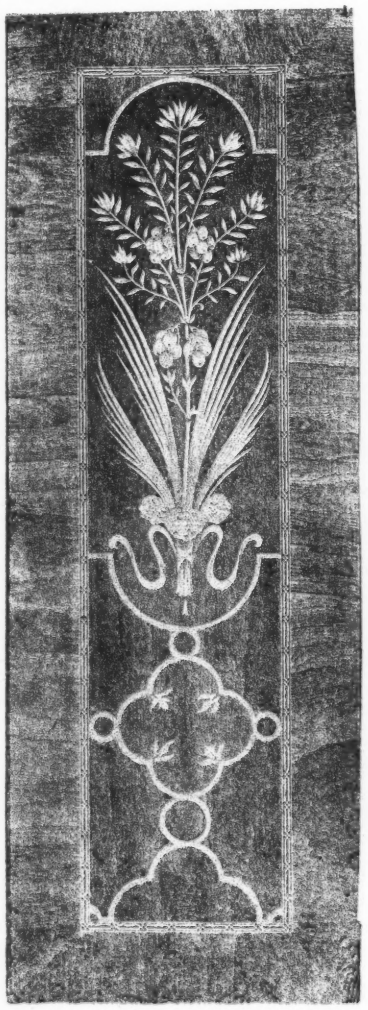

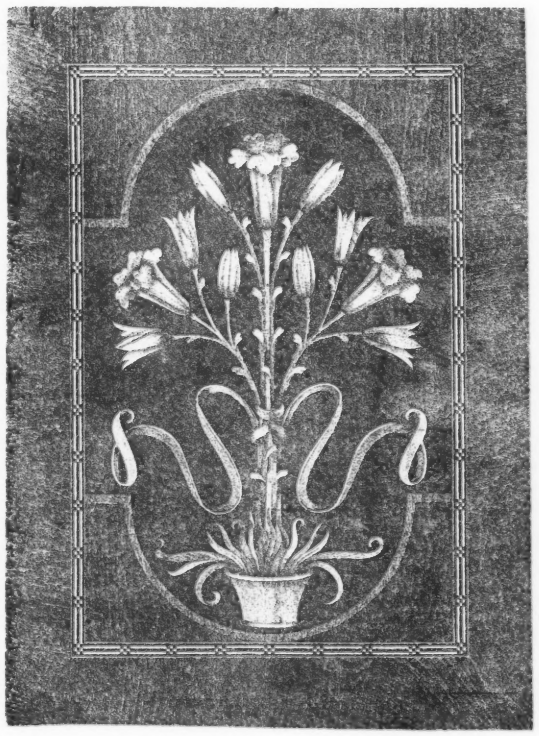

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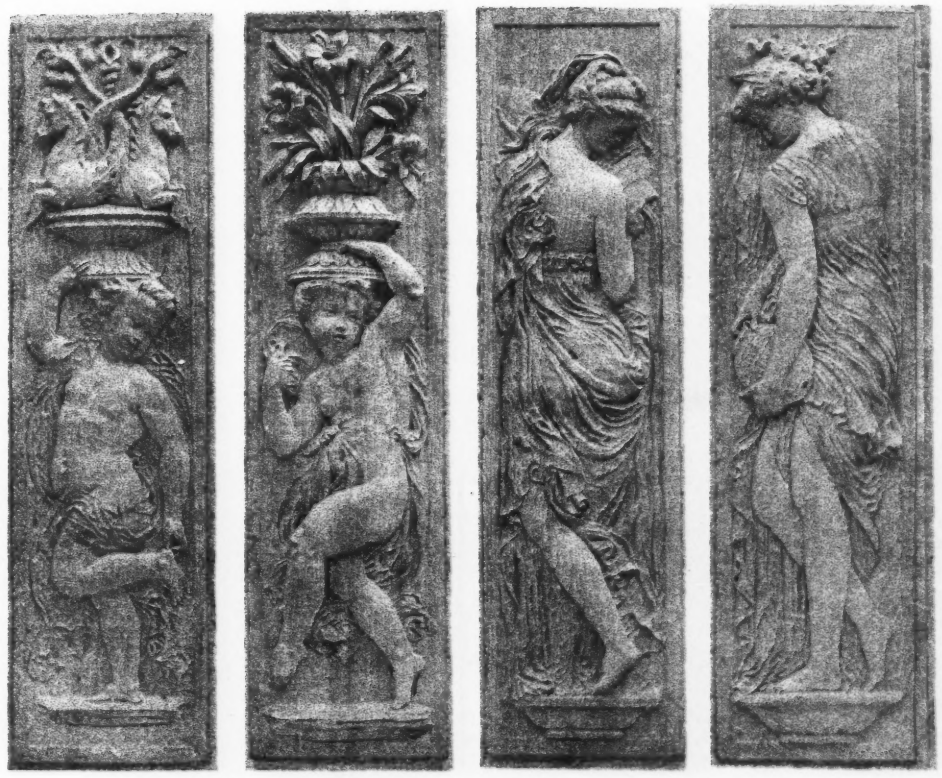

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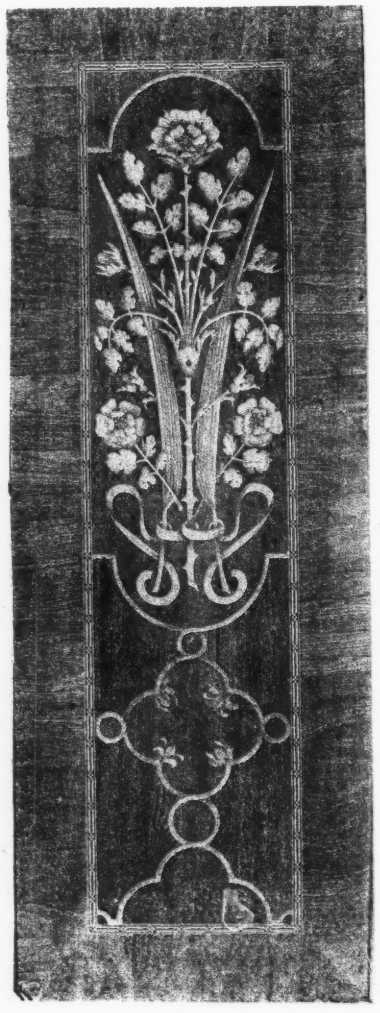

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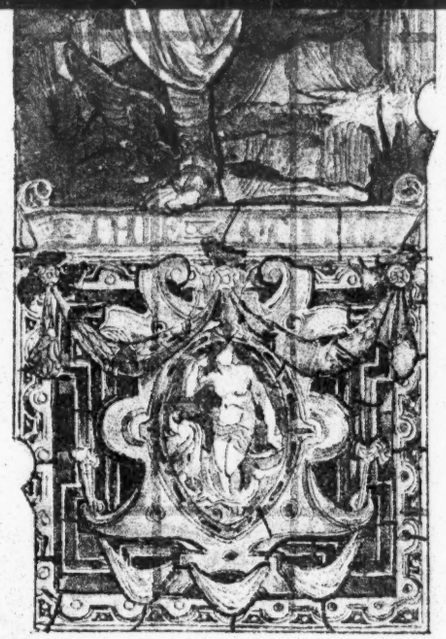

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